

UNCLASSIFIED

| |
|--|
| |
| |
| |
| AD NUMBER |
| AD901652 |
| NEW LIMITATION CHANGE |
| TO Approved for public release, distribution unlimited |
| FROM Distribution authorized to U.S. Gov't. agencies only; Test and Evaluation; Feb 1972. Other requests shall be referred to Air Systems Division, Attn: SDQH, Wright-Patterson AFB, OH 45433. |
| AUTHORITY |
| ASD ltr, per DTIC Form 55, 17 Apr 1974 |

THIS PAGE IS UNCLASSIFIED

AD901652

FTC-TR-72-17



FTC-TR-72-17



VOLUME II OF II
**CATEGORY II
PERFORMANCE TEST
OF THE
UH-1N HELICOPTER**

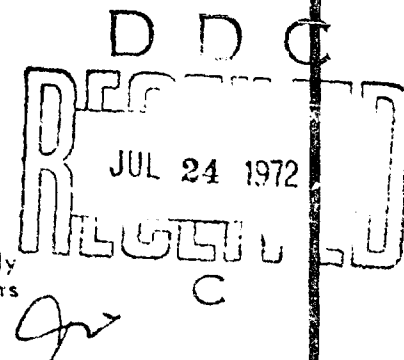
ROBERT H. SPRINGER
Project Engineer

DONALD BERGER
Lieutenant Colonel, USAF
Project Pilot

TECHNICAL REPORT No. 72-17

MAY 1972

Distribution limited to U.S. Government agencies only
(Test and Evaluation), February 1972. Other requests
for this document must be referred to ASD (SDQH),
Wright-Patterson AFB, Ohio 45433.



**AIR FORCE FLIGHT TEST CENTER
EDWARDS AIR FORCE BASE, CALIFORNIA
AIR FORCE SYSTEMS COMMAND
UNITED STATES AIR FORCE**

Best Available Copy

A
F
F
H
C

FILE COPY

DDC release to OTS is not authorized

Do not return this copy, Retain or destroy

Best Available Copy

table of contents

| | Page |
|--|------|
| LIST OF ILLUSTRATIONS _____ | ii |
| LIST OF TABLES _____ | iv |
| APPENDIX I - TEST TECHNIQUES, DATA ANALYSIS METHODS, AND TEST DATA _____ | 1 |
| General _____ | 1 |
| Pitot-Static System Calibration _____ | 2 |
| Hover _____ | 2 |
| Takeoff _____ | 3 |
| Climb _____ | 5 |
| Level Flight _____ | 7 |
| Vibration _____ | 8 |
| Autorotational Desents _____ | 8 |
| Slope Landing _____ | 9 |
| Height-Velocity _____ | 10 |
| Power Determination _____ | 11 |
| APPENDIX II - GENERAL AIRCRAFT INFORMATION _____ | 182 |
| Dimensions and Design Data _____ | 182 |
| Rotor Systems _____ | 185 |
| Power Plant _____ | 186 |
| Weight and Balance _____ | 187 |
| Flight Limits _____ | 187 |
| Test Instrumentation _____ | 187 |
| Instrumentation List _____ | 187 |

list of illustrations

| <u>Figure No.</u> | <u>Title</u> | <u>Page No.</u> |
|-------------------|--|-----------------|
| Appendix I | | |
| 1 | Airspeed Calibration - ΔV_{pc} _____ | 14 |
| 2 | Airspeed Calibration - Standard System _____ | 15 |
| 3 | Altimeter Static Source Calibration _____ | 16 |
| 4-6 | Nondimensional Hovering Performance Summary _____ | 17-19 |
| 7-13 | Nondimensional Hovering Performance _____ | 21-27 |
| 14-17 | Flight Control Positions in Hovering Flight _____ | 29-32 |
| 18 | Nondimensional Takeoff Performance _____ | 33 |
| 19-21 | Takeoff Distance Required to Clear a 50-ft Obstacle _____ | 34-36 |
| 22 | Nondimensional Takeoff Performance _____ | 37 |
| 23-25 | Takeoff Distance Required to Clear a 50-ft Obstacle _____ | 38-40 |

| <u>Figure No.</u> | <u>Title</u> | <u>Page No.</u> |
|-------------------|---|-----------------|
| 26 | Nondimensional Takeoff Performance _____ | 41 |
| 27-29 | Takeoff Distance Required to Clear a 50-ft Obstacle _____ | 42-44 |
| 30 | Nondimensional Takeoff Performance _____ | 45 |
| 31-33 | Takeoff Distance Required to Clear a 50-ft Obstacle _____ | 46-48 |
| 34 | Nondimensional Takeoff Performance _____ | 49 |
| 35-37 | Takeoff Distance Required to Clear a 50-ft Obstacle _____ | 50-52 |
| 38-39 | Sawtooth Climb Performance _____ | 53-54 |
| 40-41 | Continuous Climb Performance _____ | 55-56 |
| 42-51 | Nondimensional Level Flight Performance Summary _____ | 57-66 |
| 52-101 | Nondimensional Level Flight Performance _____ | 67-116 |
| 102-111 | Vibration Characteristics _____ | 117-126 |
| 112-113 | Pitch Link Load Survey _____ | 127-128 |
| 114-117 | Sawtooth Autorotational Descent Performance _____ | 129-132 |
| 118 | Slope Landing Slope Angle Limits and Cyclic Control Positions _____ | 133 |
| 119-126 | Height-Velocity Performance _____ | 134-141 |
| 127-138 | Engine Characteristics _____ | 142-153 |
| 139-141 | Engine Inlet Characteristics _____ | 154-156 |
| 142-153 | Engine Characteristics _____ | 157-168 |
| 154-159 | Engine Inlet Characteristics _____ | 169-174 |
| 160-161 | Engine Topping Variance with T_a _____ | 175-176 |
| 162-163 | Single Engine Shaft Horsepower Available _____ | 177-178 |
| 164-165 | Time History of Engine Topping _____ | 179-180 |
| 166 | Comparison of Pilot Panel and Special Instrumentation Readings for ITT and N_g _____ | 181 |

Appendix II

| | | |
|-----|--|---------|
| 1 | Principal UH-1N Dimensions _____ | 183 |
| 2 | Torquemeter Operation _____ | 187 |
| 3-8 | Combining Gearbox Torquemeter Calibration _____ | 188-193 |
| 9 | Longitudinal Center of Gravity Limit Envelope _____ | 194 |
| 10 | Airspeed Limit Envelope _____ | 195 |

list of tables

| <u>Table No.</u> | <u>Title</u> | <u>Page No.</u> |
|-------------------|---|-----------------|
| Appendix I | | |
| I | Summary of Hover Test Conditions | 3 |
| II | Summary of Level Flight Test Conditions | 6-7 |



APPENDIX I

TEST TECHNIQUES, DATA ANALYSIS METHODS, AND TEST DATA

General

Dimensional analysis of the major items affecting helicopter performance yielded the variables used to present performance data. These dimensionless variables are defined as follows:

$$C_P = \frac{\text{shp} \times 550}{\rho A (\Omega R)^3} = K_1 \left[\frac{\text{shp}}{\delta_a \sqrt{\theta_a}} \right] \left[\frac{1}{N_R / \sqrt{\theta_a}} \right]^3$$

$$C_T = \frac{W}{\rho A (\Omega R)^2} = K_2 \left[\frac{W}{\delta_a} \right] \left[\frac{1}{N_R / \sqrt{\theta_a}} \right]^2$$

$$M_{TIP} = \frac{V_t + 0.592 (\Omega R)}{38.967 \sqrt{T_a}} = K_3 \left[\frac{N_R}{\sqrt{\theta_a}} \right] (1 + \mu)$$

$$\mu = \frac{V_t}{\Omega R} = K_4 \left[\frac{1}{N_R / \sqrt{\theta_a}} \right] \left[\frac{V_c}{\sqrt{\delta_a}} \right]$$

Notes:

- (1) Constants K_1 through K_4 pertain to specific rotor systems and are:
 $K_1 = 64138149/(R)^5$, $K_2 = 12211.87223/(R)^4$, $K_3 = 0.00009373/(R)$.
 For the UH-1N they are: $K_1 = 8.0549$, $K_2 = 0.0368$, $K_3 = 0.0022495$,
 $K_4 = 0.6719927$ (for V_c in knots).
- (2) For the test conditions encountered, it was assumed that $V_t \sqrt{\sigma} = V_c$,
 i.e., $\Delta V_c = 0$. ΔV_c = compressibility correction to calibrated
 airspeed.

Pitot-Static System Calibration

Airspeed calibration tests were conducted to determine the position error of the standard and test (boom) airspeed systems. The tower fly-by and ground-speed course were the methods used. These techniques provided level flight airspeed calibrations, and also provided a static source calibration for the standard and test altimeter position errors for level flight.

The standard system was calibrated against the test boom system in climb and autorotation, the results of which are presented in figure 2, appendix I.

The test boom system had a full-swiveling pitot-static source which remained aligned with the airstream within large angles of fuselage attitude relative to the airstream.

The standard pitot-static system was also calibrated in level flight for the two UH-1N helicopters used in Category II systems and all-weather tests. The ground-speed course technique was utilized on both aircraft. The results of these tests are incorporated in the airspeed and altimeter calibration plots presented in figures 1 and 3, appendix I.

Hover

In-ground effect and out-of-ground effect tethered hovering performance data were obtained at skid heights of 2, 4, 10, 15, 25, 35, and 60 feet. Constant referred rotor speeds ($N_R/\sqrt{\theta_a}$) were flown in order to determine compressibility effects on power required. Referred rotor speeds of 300, 310, 320, and 330 rpm were flown. With this technique, the rotor speed was varied with temperature to maintain a constant $N_R/\sqrt{\theta_a}$ which resulted in a constant Mach number at the rotor blade tip. Free hover data were obtained at 100 feet skid height to verify that the aircraft was actually out of ground effect at a skid height of 60 feet. All hover tests were conducted in less than 3 knots of wind.

Table I, appendix I, lists the conditions in which the hovering data were obtained.

During the tethered hovering tests the helicopter was tethered to the ground by a cable and load cell (which measured cable tension). Thrust produced was assumed equal to the gross weight of the helicopter, cable and load cell plus the cable tension.

Power coefficient (C_p) was plotted against thrust coefficient (C_T) for each skid height; fairings defined by points of equal referred rotor speed ($N_R/\sqrt{\theta_a}$) were established. The hover data are presented in figures 4 through 13, appendix I.

Hover summaries were derived for specified altitude and temperature conditions at maximum power available utilizing the nondimensional hover plots and are presented in figures 5 and 6.

Table I

SUMMARY OF HOVER TEST CONDITIONS

| Skid Height (ft) | $N_R/\sqrt{\sigma_a} = 300 \text{ rpm}$ | | $N_R/\sqrt{\sigma_a} = 310 \text{ rpm}$ | | $N_R/\sqrt{\sigma_a} = 320 \text{ rpm}$ | | $N_R/\sqrt{\sigma_a} = 330 \text{ rpm}$ | |
|------------------|---|-------------|---|-------------|---|-------------|---|---------------------|
| | Pressure Altitude (ft) | FAT (deg C) | Pressure Altitude (ft) | FAT (deg C) | Pressure Altitude (ft) | FAT (deg C) | Pressure Altitude (ft) | FAT (deg C) |
| 2 | 9,560 | 9 | 2,130 9,560 | -7 8 | 1,990 9,560 | -1 8 | 1,970 2,110 10,170 | -1 -4 -6 |
| 4 | 9,570 | 9 | 2,720 9,590 | -7 8 | 2,170 9,590 | 0 7 | 2,160 2,110 10,230 | 0 -4 -7 |
| 10 | 9,640 | 10 | 1,990 9,640 | -4 9 | 1,930 9,640 | -5 9 | 1,930 2,080 10,270 | -5 -6 -7 |
| 15 | - - - | | 2,060 9,850 | 0 0 | 2,030 9,850 | -2 -1 | 2,030 2,110 9,670 9,840 | -2 -4 3 -1 |
| 25 | 9,640 | 7 | 2,170 9,600 | 1 6 | 2,170 9,620 | 1 5 | 2,170 2,080 9,850 | 1 5 -2 |
| 35 | - - - | | 2,190 9,860 | 2 -1 | 2,190 9,820 | 2 -1 | 2,180 2,080 9,820 | 0 -5 -3 |
| 60 | - - - | | 2,050 9,640 | -2 -0 | 2,060 9,650 | -2 0 | 2,060 2,100 9,650 | -2 -5 0 |
| 100 | 4,090 9,700 | 2 -2 | 4,100 9,700 | 1 -2 | 4,100 9,690 | 1 -2 | 4,100 9,690 | 1 -2 |

Note: All above conditions are average values.

Takeoff

General

Takeoff tests were conducted at an average pressure altitude of 9,700 feet. Gross weight was varied from approximately 9,000 to 10,500 pounds. Initial rotor speed was 324 rpm (100 pct), and all takeoffs were made with a mid (sta 137.0) cg loading. Maximum available power was used for all takeoffs. For airspeeds below 25 KIAS, a pace vehicle was used as a reference to obtain the desired airspeed.

Power, weight and atmospheric conditions were recorded for each takeoff. A Fairchild Flight Analyzer was used to record a time history of each takeoff. Ground speed and horizontal and vertical distances were derived from the time histories. The test results are presented in figures 18 through 37, appendix I.

The ΔC_p parameter was used to correlate the takeoffs. The excess power available (ΔC_p) was defined as the difference between the maximum power available recorded at the 50 foot height and the power required to

hover at a referenced skid height (4 feet and 15 feet). This definition may be expressed in the nondimensional power coefficient term as $\Delta C_p = C_{p\text{Available}} - C_{p\text{Required to hover}}$. Gross weight was varied to obtain a wide range of ΔC_p values. For each ΔC_p , a plot of distance to a 50-foot height versus true climbout airspeed was constructed. A carpet plot using ΔC_p for correlation was then constructed showing distance required for various climbout airspeeds in terms of the excess power available.

The following takeoff techniques were investigated to determine the takeoff performance of the UH-1N:

1. Level acceleration from a 4-foot hover with and without rotor rpm bleed.
2. Level acceleration from a 15-foot hover.
3. Climb and acceleration from light-on-skids with and without rotor rpm bleed.

Takeoff Techniques

The level acceleration (no rotor rpm bleed) technique was performed as follows:

The helicopter was stabilized at the desired hover height with rotor rpm (N_R) set at 100 percent (324 rpm). The helicopter was then transitioned into forward flight as smoothly and rapidly as possible with use of cyclic and collective pitch. Collective pitch was increased to the maximum possible without drooping the rotor below 100-percent rpm. The power turbine governor (beep) switch was increased to maximum during the transition, and N_R was controlled with collective pitch. The helicopter was transitioned into forward flight at a constant skid height until the desired takeoff speed was reached. As the takeoff speed was reached, the pitch attitude of the helicopter was adjusted to maintain the desired airspeed until above the desired 50-foot altitude. This technique also applied to level acceleration takeoff from a 15-foot hover, simulating a sling load.

The level acceleration (with rotor bleed) technique was basically the same as the "no bleed" technique with the exception of the N_R control. In the "bleed" technique, the N_R was slowly bled off in the climb so as to drop from 100 percent in the level acceleration to 97 percent (314 rpm) upon reaching 50 feet of altitude.

The climb and acceleration technique was performed as follows:

Beginning from a light-on-the-skids condition, power was increased to maximum as the aircraft left the ground; desired airspeed was obtained by holding pitch attitude. For these tests the pitch attitude was set at 3 degrees noseup on the ground. The maximum pitch attitude used was 10 degrees nosedown at a climbout airspeed of 45 knots. At 2 degrees nosedown, a climbout airspeed of 25 knots was achieved. During the climb the rotor rpm was held constant at 100 percent. Upon reaching 50 feet, the airspeed was allowed to increase while maintaining altitude. The climb and accelerate technique was also repeated using the N_R "bleed" technique. In this technique the N_R was "bled" at approximately 2 rpm

per second from 100 percent at 15 feet to 97 percent at 50 feet. Upon reaching 50 feet, the collective pitch was reduced very slightly to allow N_R to increase while maintaining altitude.

Climb

Sawtooth climbs were conducted at pressure altitudes of 5,000, 10,000, and 14,000 feet at gross weights of approximately 8,500 and 10,000 pounds and at maximum continuous power (88-percent torque).

The observed rates of climb were corrected to test day tapeline rate of climb using the following equation:

$$R/C_t = \frac{dh}{dt} \times \frac{T_{a_t}}{T_{a_s}}$$

where

R/C_t = rate of climb (tapeline), feet per minute

$\frac{dh}{dt}$ = slope of the pressure altitude versus time curve, feet per minute

T_{a_t} = test day ambient temperature, degrees K

T_{a_s} = standard day temperature for the test attitude, degrees K

The test day values of the rates of climb for the altitudes and temperatures tested are presented in figures 38 and 39, appendix I. A summary of the climb performance is presented in table II.

Two continuous climbs were conducted from a 2,000-foot pressure altitude to the service ceiling or envelope limit using a mid cg location, maximum continuous power, 314-rpm rotor speed, and climb-start gross weights of 8,790 and 10,400 pounds. Only one climb was made at each gross weight. The climb tests were conducted at 53 KIAS on the nose-boom airspeed system. This speed was determined from the minimum power required from the level flight speed-power tests.

The observed rates of climb were corrected to test day tapeline rates of climb as discussed for the sawtooth climbs.

The test day values for the rate of climb are presented along with shaft horsepower required, calibrated airspeed, true airspeed, gross weight, fuel used, time to climb, nautical air miles traveled, ambient air temperatures, and pressure altitude. Results of the continuous climb tests for test day conditions are presented in figures 40 and 41, appendix I.

Table II
SUMMARY OF LEVEL FLIGHT TEST CONDITIONS
UH-1N USAF S/N 68-10776
T400-CP-400 Engine
Category II

| Cond No. | $C_T \times 10^4$ | Avg $N_R / \sqrt{\theta_a}$ (rpm) | Avg Gross Weight (lb) | Avg Pressure Altitude (ft) | Avg FAT (deg C) | Avg N_R (rpm) | Remarks |
|----------|-------------------|-----------------------------------|-----------------------|----------------------------|-----------------|-----------------|---------------|
| 1 | 28 | 340 | 7,800 | 3,250 | -25 | 315 | |
| 1 | 28 | 340 | 7,900 | 2,980 | -12 | 323 | Single engine |
| 2 | 32 | 319 | 7,940 | 3,090 | 4 | 313 | |
| 2 | 32 | 319 | 7,960 | 3,270 | 4 | 313 | |
| 2A | 32 | 300 | 7,580 | 940 | 21 | 303 | |
| 2B | 32 | 310 | 7,970 | 1,370 | 20 | 313 | |
| 3 | 32 | 331 | 8,430 | 3,420 | -7 | 319 | |
| 3 | 32 | 329 | 8,380 | 3,420 | -15 | 312 | Single engine |
| 3 | 32 | 330 | 8,660 | 2,410 | -9 | 316 | Single engine |
| 4 | 32 | 333 | 8,510 | 3,260 | 0 | 324 | |
| 5 | 32 | 338 | 8,430 | 4,470 | -7 | 311 | |
| 6 | 32 | 339 | 8,150 | 5,760 | -26 | 314 | |
| 7 | 32 | 341 | 8,560 | 4,500 | -23 | 315 | |
| 8 | 36 | 300 | 8,600 | 710 | 24 | 305 | |
| 9 | 36 | 310 | 9,120 | 970 | 24 | 314 | |
| 10 | 36 | 321 | 8,180 | 5,510 | 0 | 312 | |
| 10A | 36 | 319 | 8,520 | 4,420 | 16 | 320 | |
| 10 | 36 | 320 | 8,460 | 4,650 | 2 | 313 | Heat on |
| 10 | 36 | 320 | 8,580 | 4,350 | 9 | 316 | Fwd cg |
| 10 | 36 | 323 | 8,520 | 4,490 | 5 | 317 | Aft cg |
| 11 | 36 | 323 | 8,090 | 7,900 | -3 | 321 | |
| 12 | 36 | 341 | 7,840 | 10,070 | -20 | 319 | |
| 12 | 36 | 340 | 8,030 | 9,790 | -18 | 320 | Single engine |
| 13 | 40 | 301 | 9,230 | 1,650 | 23 | 305 | |
| 14 | 40 | 310 | 8,750 | 4,860 | 15 | 310 | |
| 14 | 40 | 310 | 9,250 | 3,300 | 26 | 316 | Full armament |
| 15 | 40 | 320 | 8,510 | 7,260 | 0 | 312 | |
| 16 | 40 | 329 | 8,080 | 10,260 | 2 | 321 | |
| 16 | 40 | 330 | 8,430 | 9,150 | -14 | 313 | Single engine |
| 17 | 40 | 339 | 9,870 | 6,620 | -24 | 316 | |
| 19 | 43 | 301 | 9,900 | 1,760 | 24 | 305 | |
| 20 | 43 | 311 | 9,180 | 5,460 | 18 | 312 | |
| 20 | 43 | 310 | 8,700 | 6,950 | 17 | 310 | Rockets only |
| 20 | 43 | 310 | 9,480 | 4,130 | 25 | 316 | Full armament |
| 21 | 43 | 320 | 8,920 | 7,890 | 7 | 316 | |
| 22 | 43 | 331 | 8,610 | 10,860 | -3 | 321 | |
| 22 | 43 | 332 | 8,930 | 9,580 | -3 | 322 | |

Table II (Concluded)

| Cond No. | $C_T \times 10^4$ | Avg $N_R/\sqrt{\theta_a}$ (rpm) | Avg Gross Weight (lb) | Avg Pressure Altitude (ft) | Avg FAT (deg C) | Avg N_R (rpm) | Remarks |
|----------|-------------------|---------------------------------|-----------------------|----------------------------|-----------------|-----------------|---------------|
| 23 | 43 | 340 | 9,590 | 9,320 | -27 | 314 | |
| 25 | 43 | 301 | 9,820 | 3,780 | 16 | 302 | |
| 26 | 46 | 310 | 9,030 | 7,700 | 16 | 310 | Rockets only |
| 26 | 46 | 311 | 9,430 | 6,420 | 13 | 310 | Full armament |
| 27 | 46 | 320 | 8,880 | 9,790 | -2 | 311 | |
| 29 | 46 | 339 | 8,390 | 14,340 | -30 | 311 | |
| 31 | 50 | 300 | 9,870 | 5,850 | 18 | 302 | |
| 32 | 50 | 311 | 9,450 | 8,570 | 14 | 310 | |
| 32 | 50 | 311 | 9,480 | 8,600 | 13 | 310 | |
| 33 | 50 | 319 | 9,060 | 11,290 | 8 | 316 | Full armament |
| 34 | 50 | 330 | 8,870 | 13,390 | -7 | 318 | |
| 35 | 50 | 340 | 8,440 | 16,330 | -32 | 311 | |
| 44 | 53 | 300 | 9,540 | 8,240 | 16 | 301 | |

Level Flight

Level flight performance tests were conducted to determine power required, range, fuel flow, compressibility effects, and engine characteristics. The tests were conducted at pressure altitudes from 710 to 16,330 feet, ambient air temperatures from +26 to -32 degrees C, and at average gross weights from 7,580 to 9,870 pounds. Each flight was conducted at a predetermined and constant thrust coefficient (C_T) and referred rotor speed ($N_R/\sqrt{\theta_a}$) by maintaining a constant W/δ_a relationship. This required increasing the pressure altitude as fuel was consumed and adjusting the rotor speed as the ambient air temperature varied so that W/δ_a and $N_R/\sqrt{\theta_a}$ remained constant. The data were corrected for adiabatic temperature rise created by the aircraft's forward velocity.

Level flight performance was obtained in the clean loading (twin- and single-engine), with full external armament (cargo doors open, two 7.62mm miniguns extended fixed to fire forward, and two LAU-59/A rocket launchers installed), with 2 LAU-59/A rocket launchers only, and with forward and aft cg locations. The test conditions flown are shown in table II, appendix I.

The level flight data were reduced to nondimensional form and plotted as C_p versus C_T for constant μ and for lines of constant $N_R/\sqrt{\theta_a}$. These are presented in figures 42 through 51, appendix I. The individual level flight plots are presented in figures 52 through 101, appendix I.

Level flight performance summary curves of loiter (minimum power required) fuel flow and V_C and long range cruise NAMPP and V_t were obtained by entering the nondimensional level flight plots (figures 52 through 101, appendix I, at a given set of flight conditions and obtaining the corresponding nondimensional power coefficient. Fuel flow was found by referring to sea level standard day conditions the shaft horsepower obtained from the nondimensional power coefficient and entering the engine characteristics plots. The referred fuel flow ($W_f/\delta t_2 \sqrt{\theta t_2}$) was then corrected to the desired atmospheric conditions.

Specific range was calculated using:

$$\text{NAMPP} = \frac{V_t}{W_f}$$

Vibration

Vibrations were recorded on an oscillograph, measuring both the lateral and vertical vibrations at the pilot's seat (sta 46.7) and the cargo area (sta 133). A calibration curve of single amplitude per g versus frequency was obtained. This curve was fitted by a fifth order polynomial equation. The vibration traces were divided into ten equal time segments per cycle and the amplitudes were measured. These points were fitted by a Fourier analysis. The frequency was calculated from the time of the cycle and the amplitude was calculated from the Fourier analysis. Knowing these two values and by going into the calibration curve, the g forces were obtained. These calculations were done on the IBM 1620 computer. The vibration data are presented in figures 102 through 111, appendix I.

Autorotational Descents

Autorotational descents were made to determine the airspeeds for minimum rate of descent and maximum glide range at various rotor speeds. Sawtooth descents were flown at 8,500- and 10,000-pound gross weights at 5,000 and 10,000 feet PA. Rotor speeds of 294 rpm (91 percent), 324 rpm (100 percent) and 339 rpm (104.5 percent) were investigated.

The observed rates of descent were corrected to test day tapeline rate of descent using the following equation:

$$R/D_t = \frac{dh}{dt} \times \frac{T_{a_t}}{T_{a_s}}$$

R/D_t = rate of descent (tapeline), feet per minute

$\frac{dh}{dt}$ = slope of the pressure altitude versus time curve, feet per minute

T_{a_t} = test day ambient temperature, degrees K

T_{a_s} = standard day temperature for the test altitude, degrees K

The test day values of the rates of descent are presented in figures 114 through 117, appendix I.

The airspeed for the maximum glide range was found at the point of tangency of a line drawn from the zero R/D and V_t intersection to the R/D versus V_t fairing.

Slope Landing

Slope landing tests were made to determine the maximum slope angles on which the UH-1N could be landed, and to develop the pilot techniques involved. Aircraft gross weights and cg locations tested were:

| Gross Weight (lb) | Longitudinal cg Location (sta) | Lateral cg Location (in.) |
|----------------------|--------------------------------------|---------------------------------|
| 8,500 | 137 (mid) | 0 |
| 10,000 | 137 (mid) | 0 |
| 10,000 | 141 (aft) | 0 |
| 10,000 | 133 (fwd) | 0 |
| 10,000 | 134 (fwd) | 5.2 right |

Before starting the actual slope landings, the clearance between the main rotor blades and the fuselage (including the special instrumentation test boom) was investigated. Fore and aft cyclic control inputs were made from the neutral position to full travel in increasing increments of 1 inch. Collective control inputs to full down were made from displacements up to 4.14 inches (equivalent to approximately 55-percent torque) from full down. Simultaneous fore and aft cyclic and collective inputs were made incrementally up to full cyclic travel (from neutral) and from 4.14 inches from full down collective. Main rotor blade clearance from the forward fuselage, special instrumentation noseboom, and the tailboom was observed visually. At no time did the rotor blades come closer than 10 to 12 inches from the tailboom or 15 to 20 inches from the noseboom. Blade overshoot with collective input appeared to be undetectable or negligible due to the relatively high rigidity of the rotor system.

The actual slope landing tests were performed on a hill with a large variety of slope angles up to approximately 17 degrees. The surface was typical of a type found in this desert region - decomposed granite and irregular quartz rock ranging in size from very fine gravel to rocks up to 3 inches in diameter. The helicopter landing skids made slight, if any, imprint on the surface. This surface was relatively slippery at the higher slope angles and required care when landing the aircraft.

The slope landings were made while oriented nose up-slope, nose down-slope, and cross-slope right and left. For the landing, the helicopter was first hovered just off the ground (1 to 2 feet) and allowed to stabilize. The collective was slowly lowered until the skid(s) contacted the ground. Cyclic control was applied in the up-slope direction to firmly plant the skid(s) on the slope. The collective was slowly lowered and, as the aircraft rotated, the cyclic control was applied in the up-slope direction to keep the skid in place. Once the helicopter had both skids on the slope, the collective was fully lowered and the cyclic stick was centered. The primary slope angle limiting factors were cyclic control stop limits, fuselage nose clearance and tail skid clearance. At each of the maximum slope angles tested, the cyclic control stops were reached.

Takeoff from the slope was accomplished by slowly increasing the collective until the helicopter was slightly light on the skids while holding the cyclic stick toward the up-slope. As the aircraft came off the slope the cyclic stick was centered to hold the helicopter level.

The results of the slope landing tests are shown in figure 118, appendix I.

Height-Velocity

General

Height-velocity performance tests were conducted to define the single-engine go-around and landing envelopes following a simulated single-engine failure. Tests were conducted at gross weights from 7,700 to 10,500 pounds and pressure altitudes from 2,100 to 9,600 feet.

Surface winds were 3 knots or less during these tests. A constant aircraft gross weight was maintained by reballasting as fuel was consumed. Power, weight, and atmospheric conditions were recorded for each point. A Fairchild Flight Analyzer was used to record a time history of each approach. Ground speed and horizontal and vertical distances were derived from the time histories.

A power ratio was determined for each test condition. This power ratio was defined as:

$$\frac{\text{Single-engine maximum power available}}{\text{Power required to hover OGE}}$$

These powers were the test average single-engine maximum power available and the test power required to hover OGE.

The results of the height-velocity tests are presented in figures 119 through 126, appendix I.

Technique

All height-velocity points were entered from stable, unaccelerated flight conditions. Single-engine failure was simulated by rapidly retarding the No. 2 engine to flight idle. Collective pitch control movement was delayed for 2 seconds after the throttle cut to simulate pilot reaction time. Rotor rpm (N_r) prior to cut was 100 percent. After the delay period, the collective pitch was lowered to restore the N_r to 97 percent, and the power turbine governor (beep) trim switch was increased to maximum. The power on the operating engine was kept at maximum during the landing or go-around by maintaining 97-percent N_r .

Prior to each test condition the minimum OGE single-engine level flight speed and the minimum climb speed were determined. These speeds were used as the target speeds for each data point. These speeds changed (lowered) as ground effect built up, but the out-of-ground-effect speeds were used to maintain consistency of data.

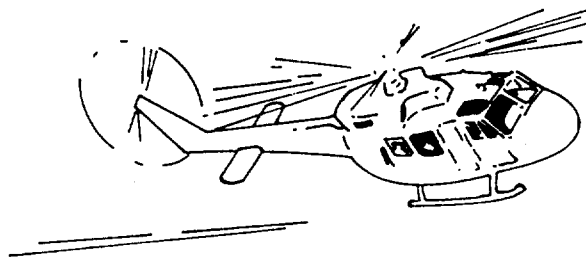
Tests were also conducted to determine the pitch attitude change required from the hover condition to achieve the target speeds. A pitch

change of approximately 20 degrees nosedown gave the best compromise between pilot task and aircraft response. This was used throughout the tests.

The tests were initiated at each test condition from the high hover condition (when OGE hover was possible). Each succeeding point was at a lower altitude until a landing was required. At that point the landing was repeated to obtain a lower touchdown speed. Each succeeding point on the curve was obtained by lowering the entry speed at each altitude until a landing was again required. The lower hover points were determined by increasing hover heights in small increments until the sink rate after engine cut indicated a harder than normal landing would occur.

From the hover conditions above 100 feet, the pitch attitude change decreased progressively as the height above the ground decreased. Below 20 feet at 5,000 foot H_p the collective pitch was not lowered to regain lost rpm to minimize a buildup of the rate of descent. At the 9,600-foot H_p point this lower altitude restriction was 30 feet.

Two landing techniques were used during these tests. The first was to minimize the flare. This was the direct result of attempting to make a go-around. When it was determined that a landing was necessary, the aircraft was flared to approximately 10 degrees noseup to reduce airspeed. Prior to touchdown the aircraft was leveled and at the same time the collective pitch control was raised to cushion the landing. This technique resulted in relatively fast but gentle touchdown speeds. The second technique was to flare the aircraft more steeply, 10 to 20 degrees noseup, to slow the touchdown speed. Collective pitch was used slightly in the flare to keep the rotor rpm from increasing excessively. An excessive N_r increase at this point would have resulted in sensing of an overspeed in the operating engines, thus reducing power which would not have been regained before touchdown. The aircraft was leveled before touchdown and collective pitch was increased to cushion the landing. This technique resulted in significantly slower touchdown speeds.



Power Determination

The combining gearbox has a hydromechanical torquemeter for each engine installed as an integral part of the combining gearbox. The operation of the torquemeter is based on the principle that a torque applied to a helical gear produces an axial force normal to its plane of rotation. Torque is measured as the difference between oil pressures in the torquemeter and in the gearbox.

Shaft horsepower was determined from inflight torquemeter readings and rotor rpm using the following equation:

$$\text{shp} = \frac{2\pi}{33,000} \times N_E \times Q$$

where

shp = engine output shaft horsepower

N_E = gearbox output shaft rotational speed, rpm

Q = output shaft torque, ft-lb

Gearbox output shaft speed was determined from rotor speed as follows:

$$N_E = N_R \times 20.37$$

where 20.37:1 is the main transmission gear ratio.

Substituting the last two equations, an equation for calculating shaft horsepower was developed:

$$\text{shp} = \frac{2\pi \times N_R \times 20.37 \times Q}{33,000} = 0.0038784 \times N_R \times Q$$

The T400-CP-400 power package as installed in the UH-1N produced a slight complication in computing shaft horsepower. Separate torquemeters are provided for each engine, however, there is only one output shaft. Therefore, when the engine was calibrated the dynamometer attached to the single output shaft read total torque for the package. The torque-meter calibration presented the sum of the two torquemeter readings in psi versus total torque in ft-lb. Therefore, total package shaft horsepower had to be computed since there was no way to compute the shaft horsepower produced by an individual engine.

The combining gearbox torquemeter calibrations for gearbox S/N 4061 and 4064 are presented in figures 3 through 8, appendix II. The uninstalled test cell, United Aircraft of Canada, Limited, calibration fairings for the engine characteristics are shown on all engine characteristic plots except for engine S/N 66126. Engine S/N 66126 was not a calibrated engine.

Referred output shaft horsepower ($\text{shp}/\delta_{t_2}\sqrt{\theta_{t_2}}$) was determined by assuming that each engine was producing one-half of the total output shaft horsepower. This shaft horsepower derived for each engine was then referred to the compressor inlet condition existing at each of the compressor inlets. The referred shaft horsepower for the two engines were then added together to obtain the total referred shaft horsepower.

Output shaft horsepower, fuel flow, gas producer turbine speed, and inter turbine temperature were generalized by the following relationships:

$$\frac{\text{shp}}{\delta_{t_2} \sqrt{\theta_{t_2}}} \text{ vs } \frac{N_g}{\sqrt{\theta_{t_2}}}$$

$$\frac{T_{t_5}}{\theta_{t_2}} \text{ vs } \frac{N_g}{\sqrt{\theta_{t_2}}}$$

$$\frac{W_f}{\delta_{t_2} \sqrt{\theta_{t_2}}} \text{ vs } \frac{N_g}{\sqrt{\theta_{t_2}}}$$

The engine characteristics data are presented in figures 127 through 138, and figures 142 through 153, appendix I.



FIGURES 1 THROUGH 166

UH-1N USAF S/N 68-10776
T400-CP-400 Engine
Category II

| Symbol | Avg Gross Weight (Lb) | Method | Remarks |
|--------|-----------------------|---------------------|-------------|
| ○ | 7830 | Ground Speed Course | A/C S/N 776 |
| □ | 8420 | Tower Fly By | A/C S/N 776 |
| △ | 8450 | Ground Speed Course | A/C S/N 774 |
| ◇ | 8200 | Ground Speed Course | A/C S/N 610 |

Notes:

1. Tailed symbols denote reciprocal headings.
2. Data obtained at mid cg.
3. Nose boom not installed on A/C S/N 774 or 610.
4. Data obtained in level flight.

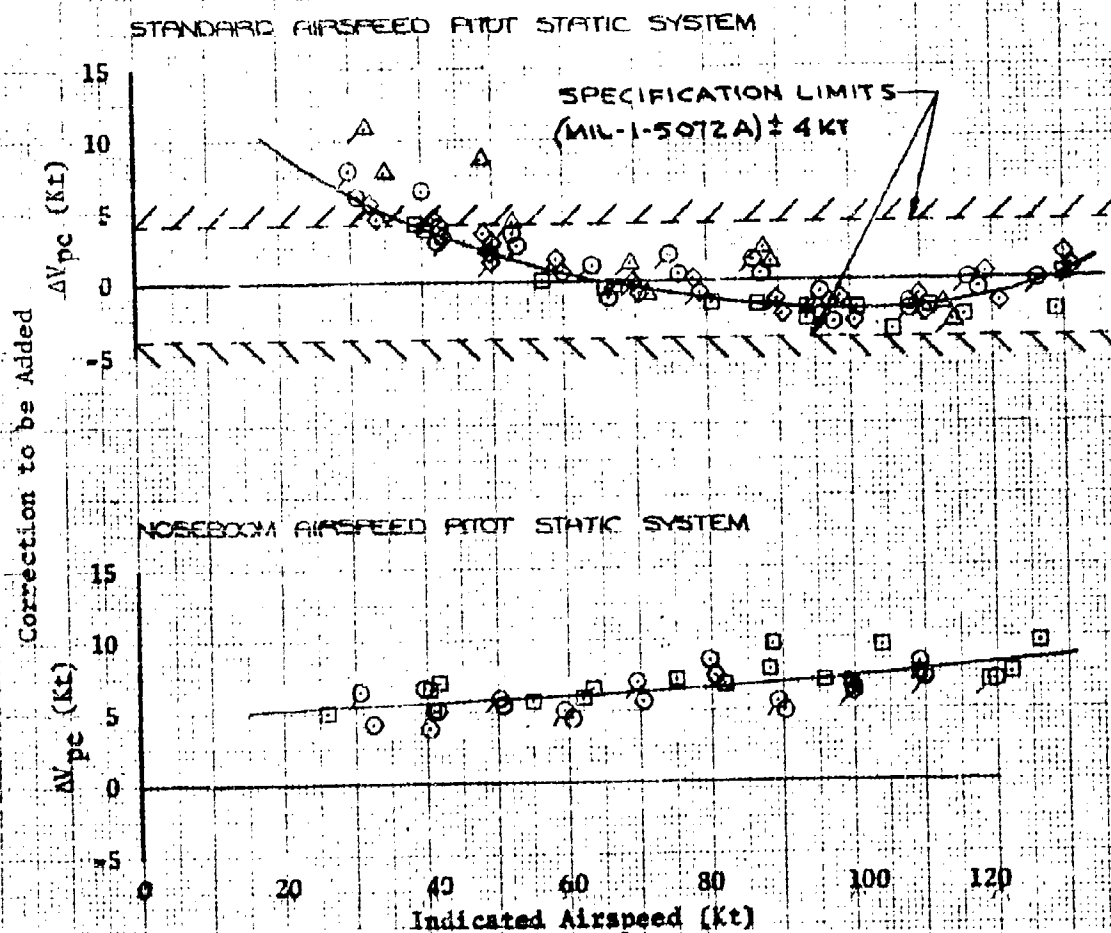


Figure 1 Airspeed Calibration - ΔV_{pc}

UH-1N USAF S/N 65-10776
T400-CP-400 ENGINE
CATEGORY II

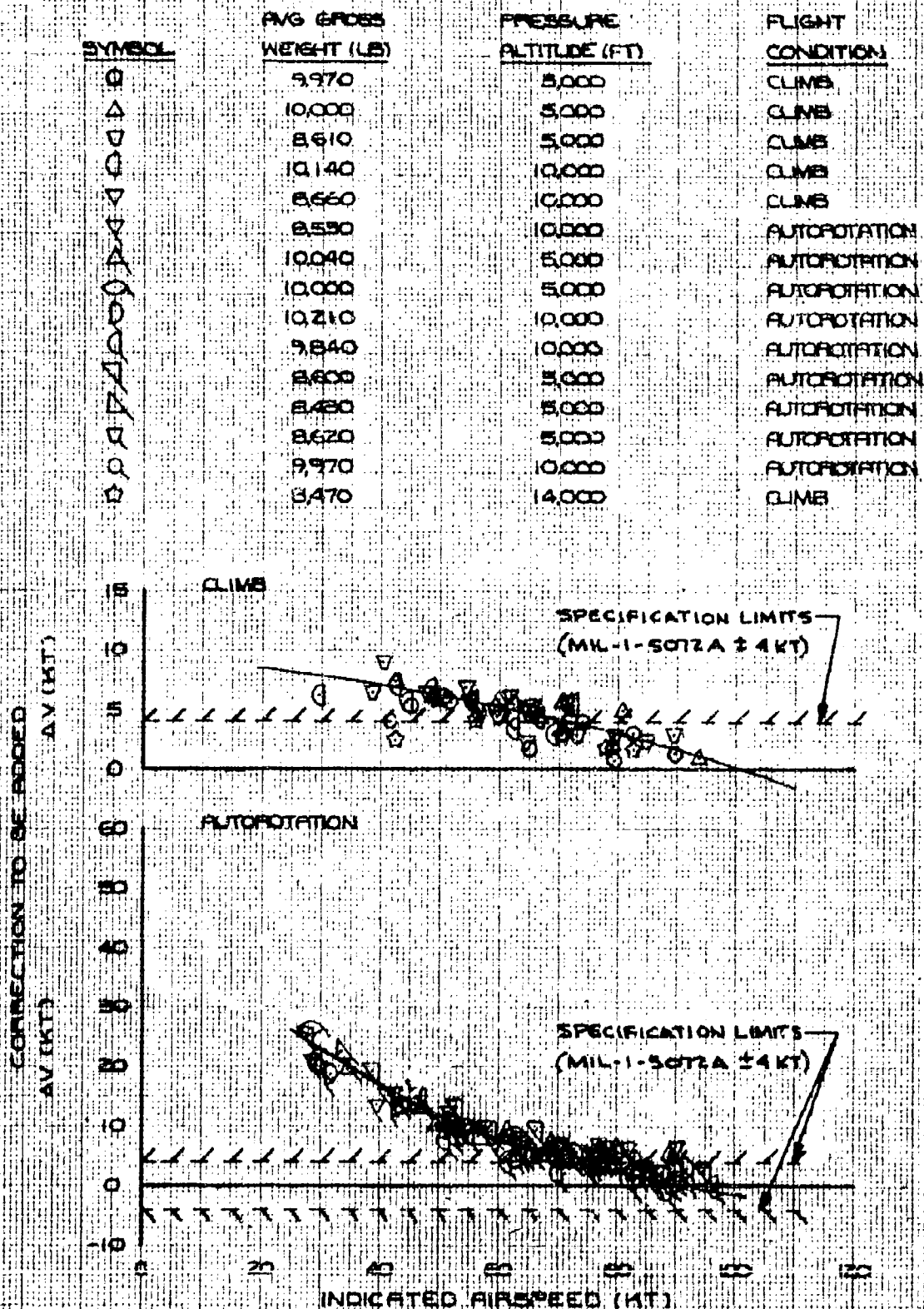


FIGURE 2 AIRSPEED CALIBRATION - STANDARD SYSTEM

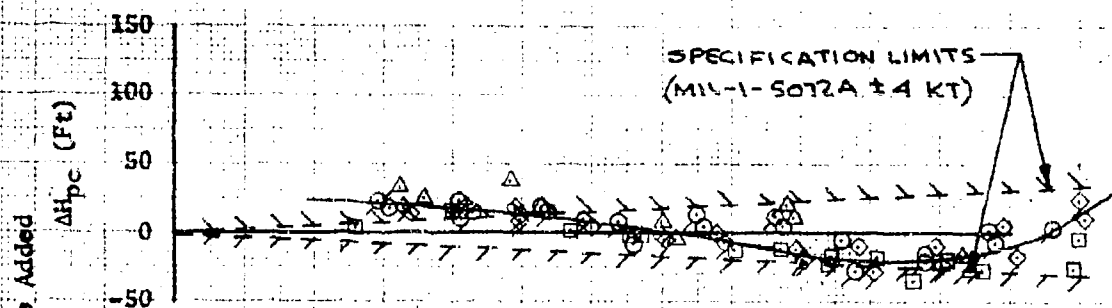
UH-1N USAF S/N 68-10776
T400-CP-400 Engine
Category II

| Symbol | Avg Gross Weight (Lb) | Method | Remarks |
|--------|-----------------------|---------------------|-------------|
| ○ | 7830 | Ground Speed Course | A/C S/N 776 |
| □ | 8420 | Tower Fly By | A/C S/N 776 |
| △ | 8450 | Ground Speed Course | A/C S/N 774 |
| ◇ | 8200 | Ground Speed Course | A/C S/N 610 |

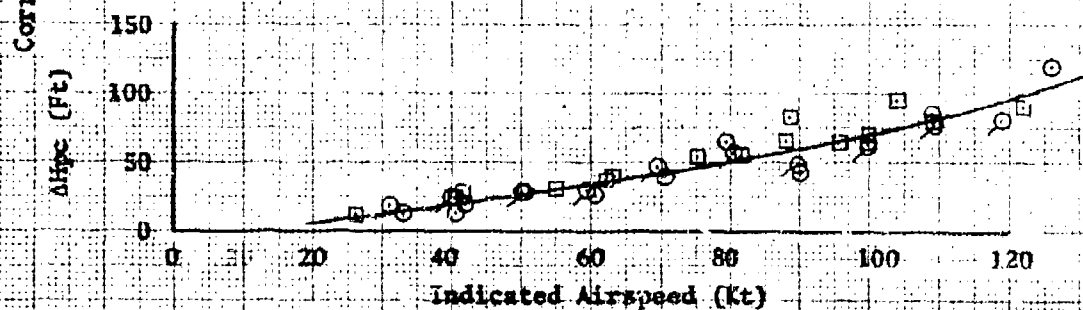
Notes:

1. Tailed symbols denote reciprocal headings.
2. Data obtained at mid cg.
3. Nose boom not installed on A/C 774 or 610.
4. Data obtained in level flight.

STANDARD ALTIMETER STATIC SOURCE SYSTEM



NOSEBOOM ALTIMETER STATIC SOURCE SYSTEM



DM-1N USAF S/N 68-10776

T400-CP-400 Engine

Category II

$N_R/\sqrt{\theta_a} = 300, 310$

Thrust Coefficient - $C_T \times 10^4$

Note:
Derived from Figures
7 through 13

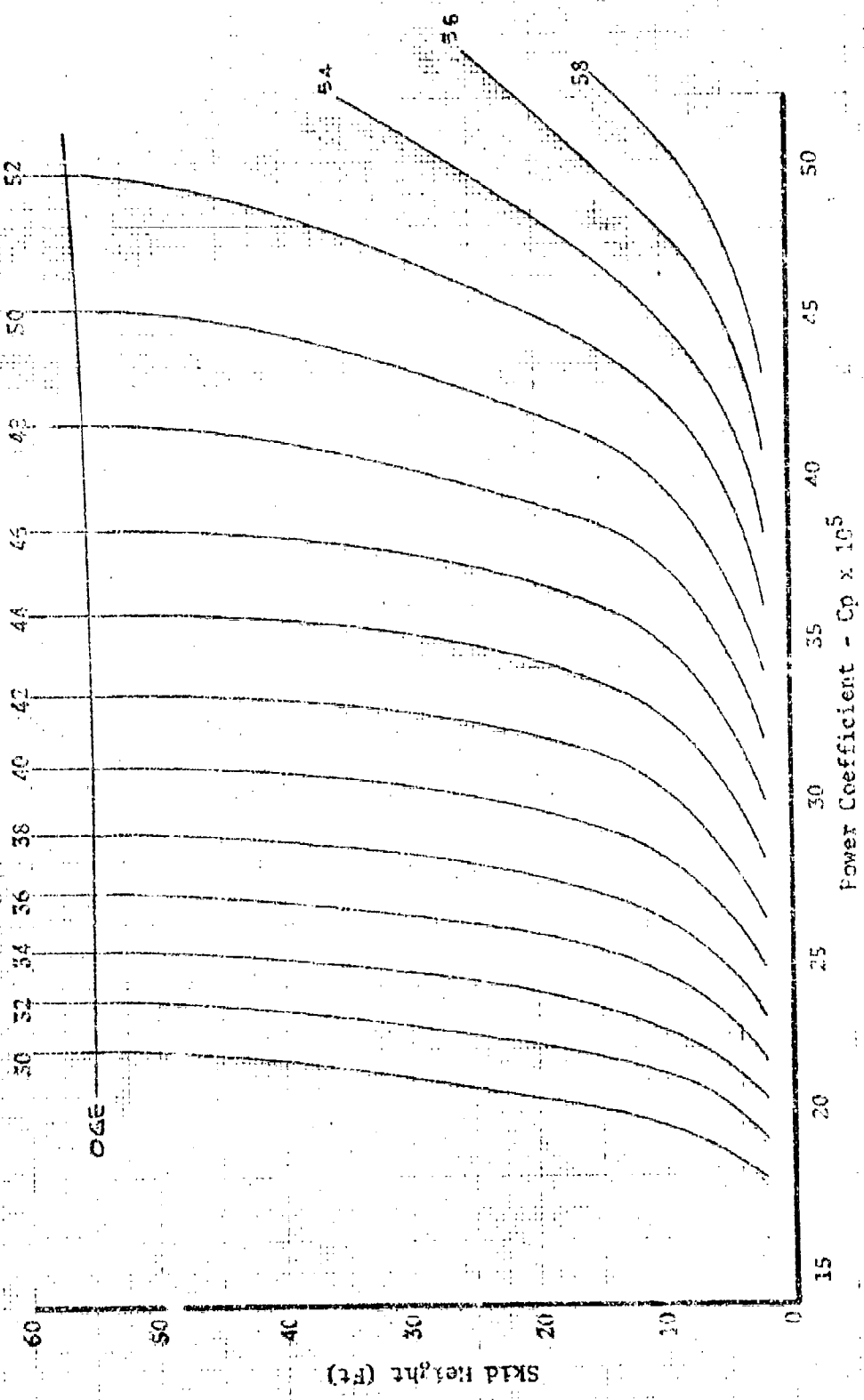


Figure 4 Nondimensional Hovering Performance Summary

UH-1N USAF S/N 68-10776

T400-CP-400 Engine

Category II

NR/ \sqrt{g} = 320

Note:

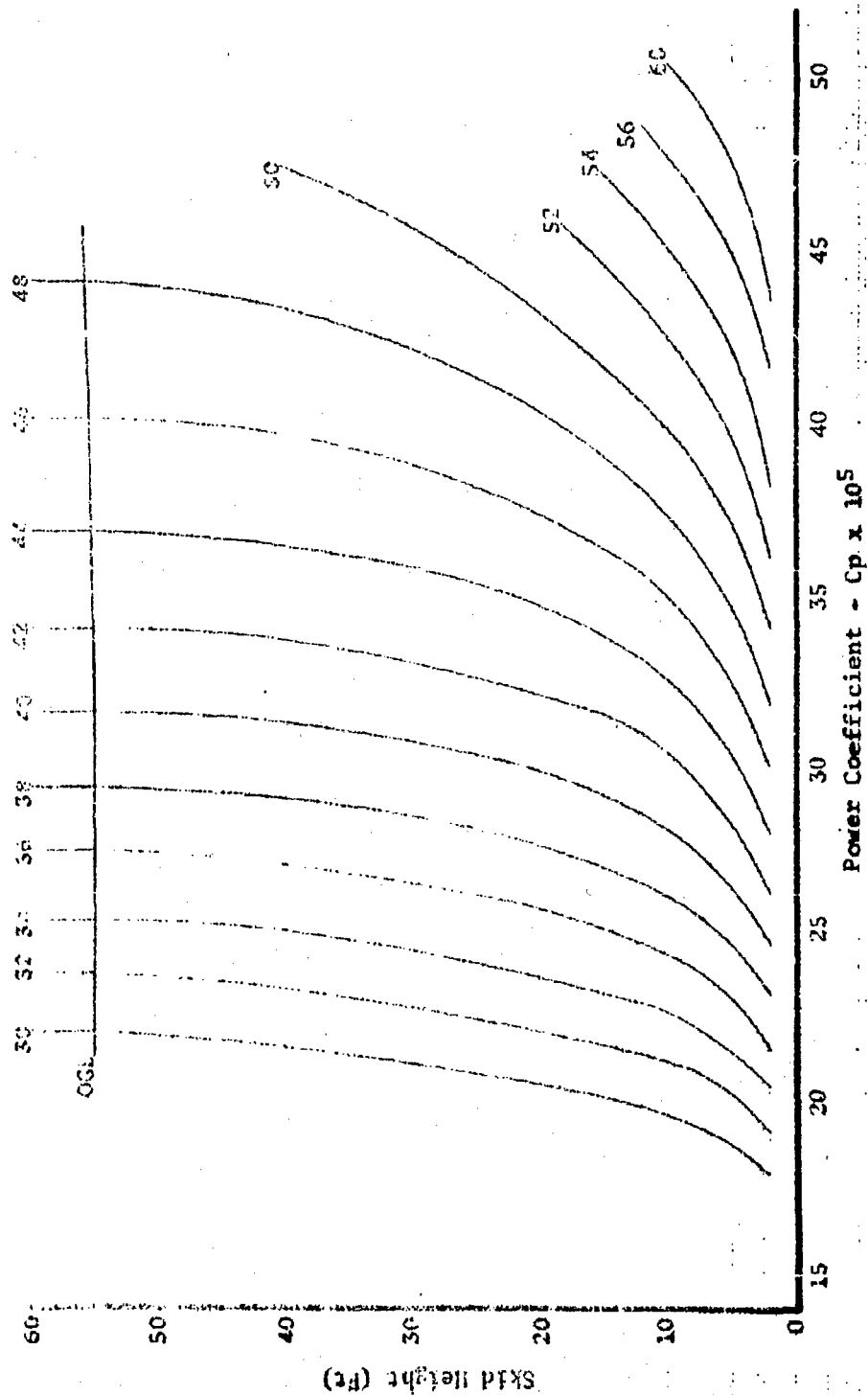
Derived from figures
7 through 12Thrust Coefficient - $C_T \times 10^6$ 

Figure 5 Nondimensional Hovering Performance Summary

UH-1N USAF S/N 68-10776

T400-CP-400 Engine

Category II

$N_R/\sqrt{C_D} = 350$

Note:
Derived from figures
7 through 12

Thrust Coefficient - $C_T \times 10^5$

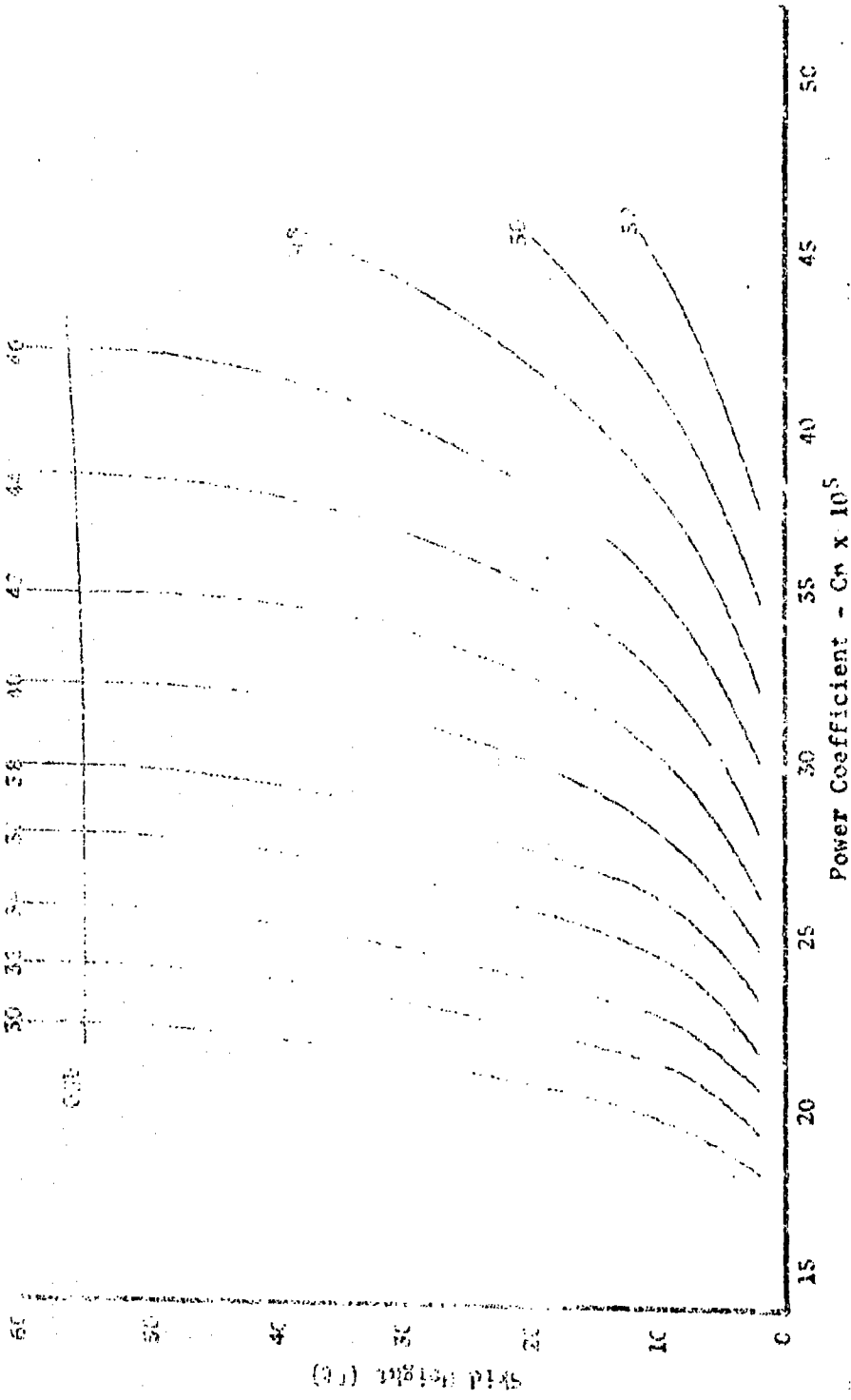


Figure 6 Nondimensional Hovering Performance Summary

UH-1N USRF S/N 68-1
T400-CP-400 ENGINE
CATEGORY II
SKID HEIGHT = 2 FT

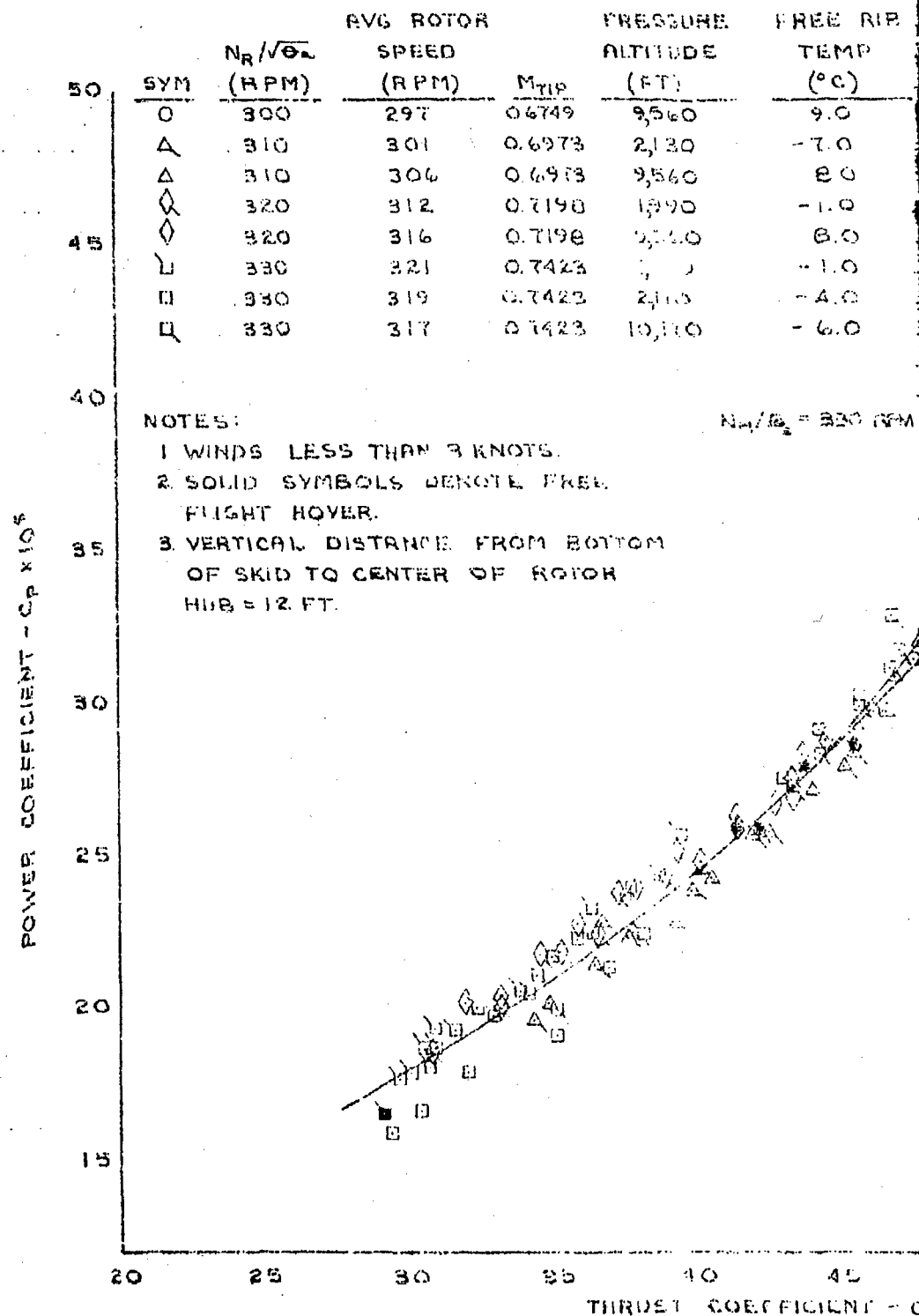
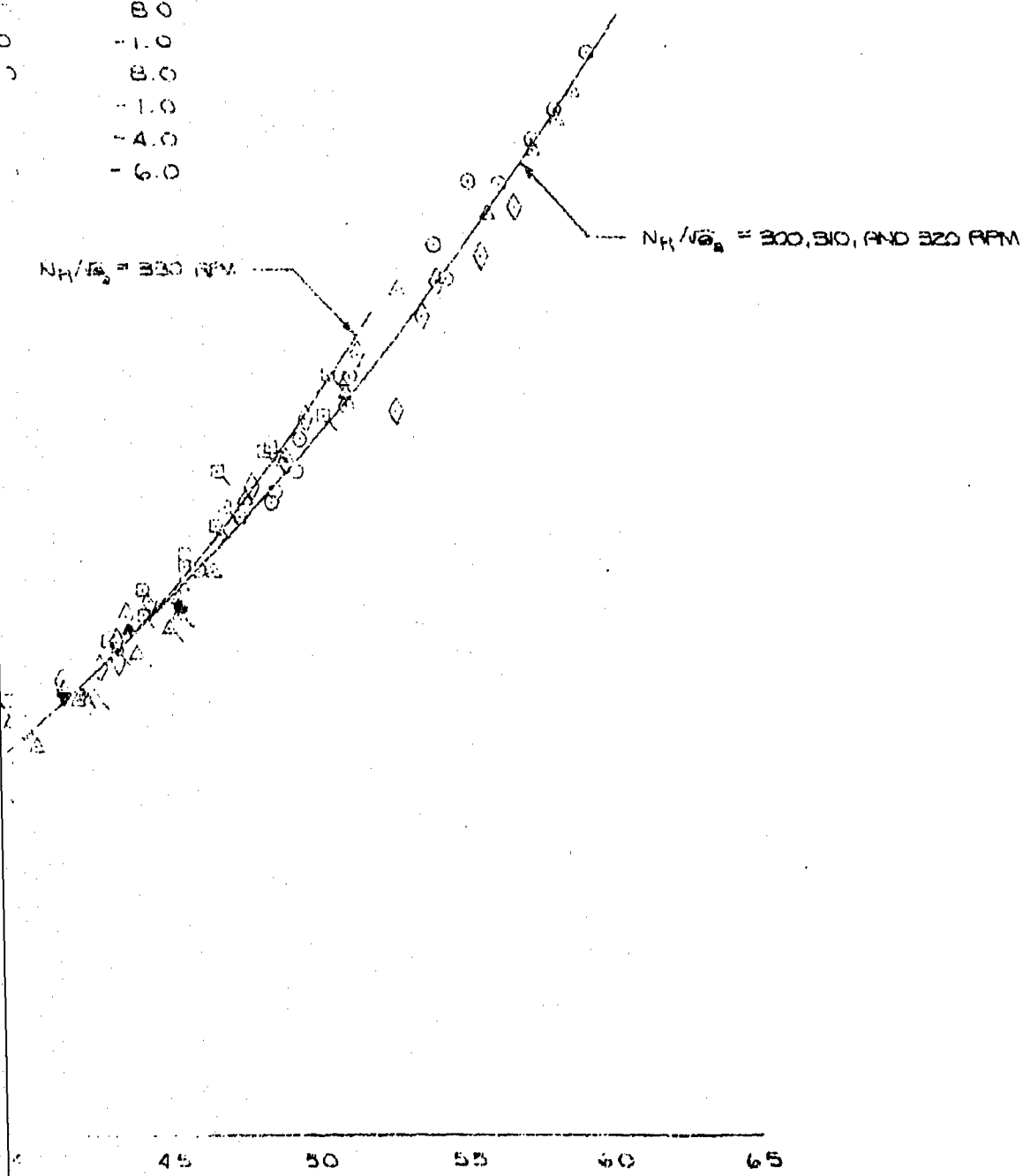


FIGURE 7 NONDIMENSIONAL HOVERING

1.591 5. N 60-10176
 400 HP-400 ENGINE
 CATEGORY II
 CRUISE HEIGHT = 2 FT

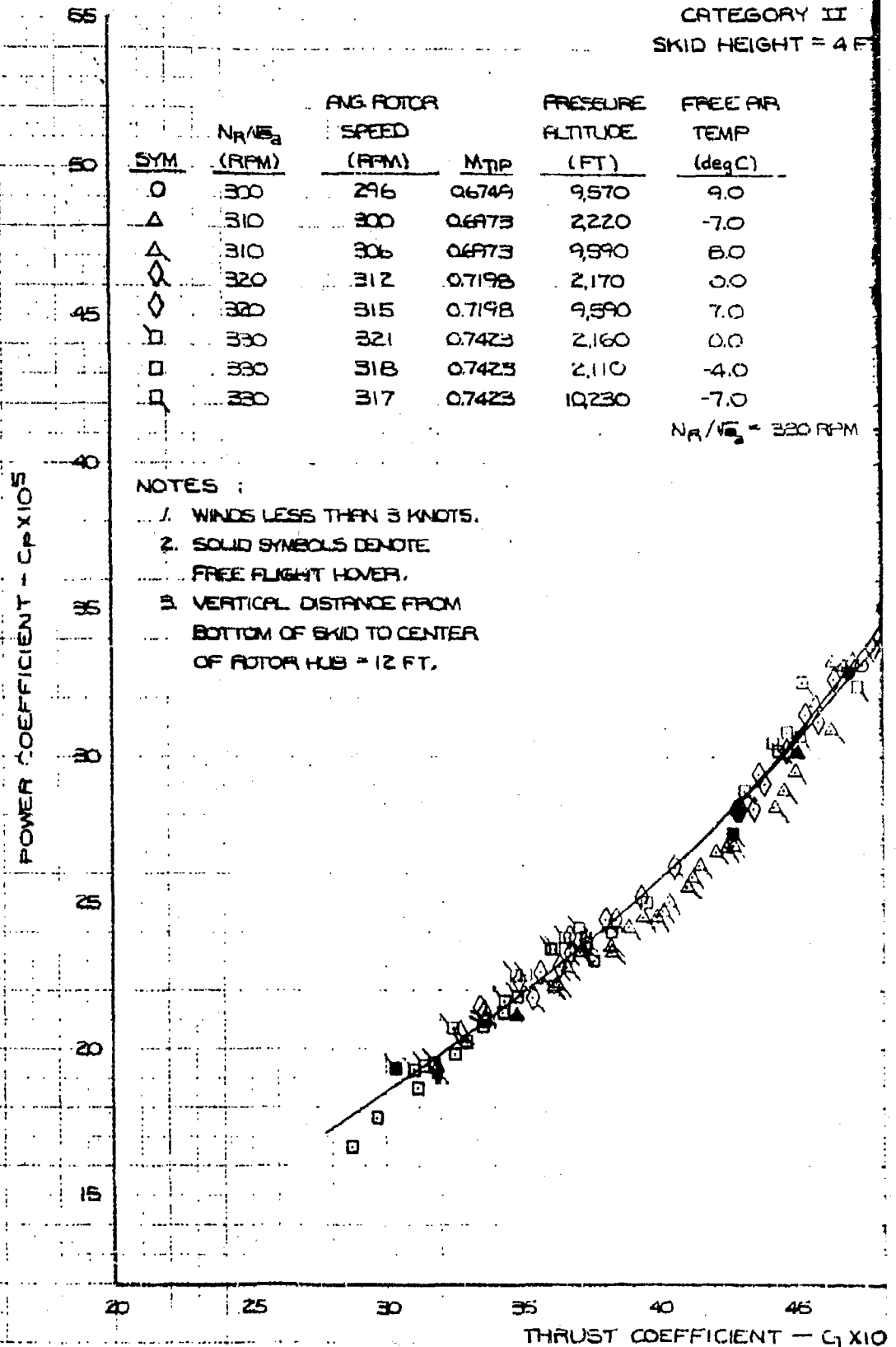
| NO. | FREE AIR TEMP (°C) |
|-----|--------------------------|
| 1 | 9.0 |
| 2 | -7.0 |
| 3 | 8.0 |
| 4 | -1.0 |
| 5 | 8.0 |
| 6 | -1.0 |
| 7 | -4.0 |
| 8 | -6.0 |



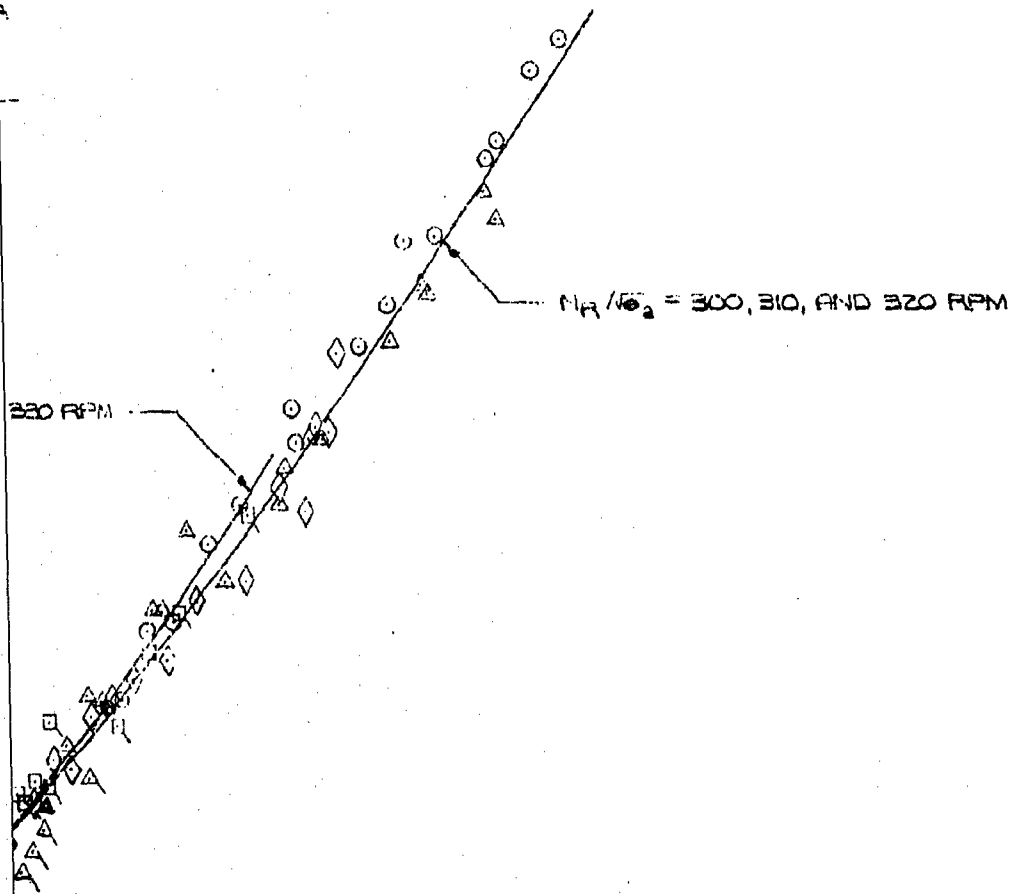
EFFICIENT - $C_t \times 10^4$
 LIFTING PERFORMANCE

2

UH-1N USAF S/N 68-10
T400-CP-400 ENGINE
CATEGORY II
SKID HEIGHT = 4 FT



N 0810776
 ENGINE
 HY 11
 HT = 4 FT



40 50 55 60 65

$C_L \times 10^4$

LIFT COEFFICIENT

UH-1N USAF S/N 68-107

T400-CP-400 ENGINE

CATEGORY II

SKID HEIGHT = 10 FT

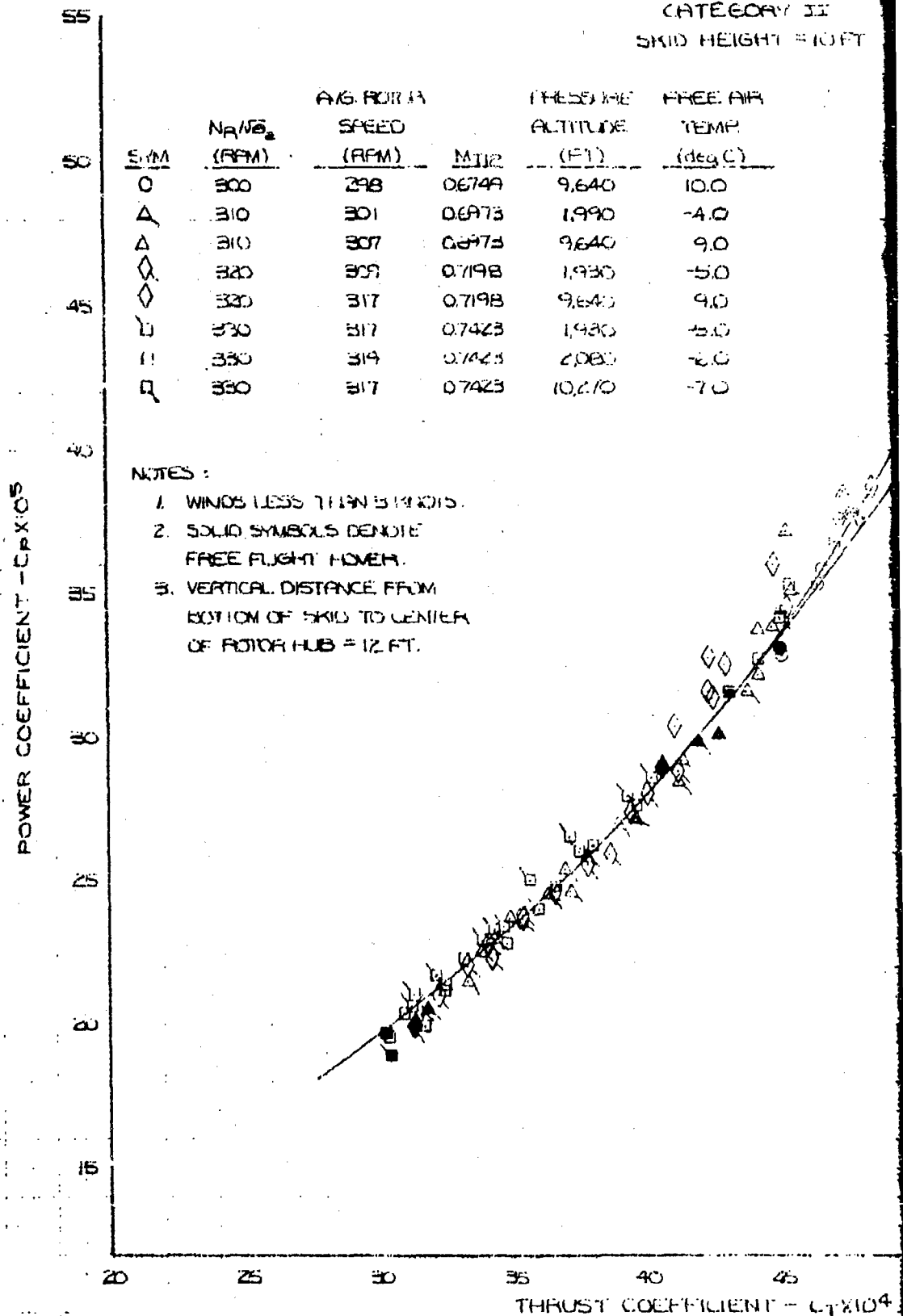
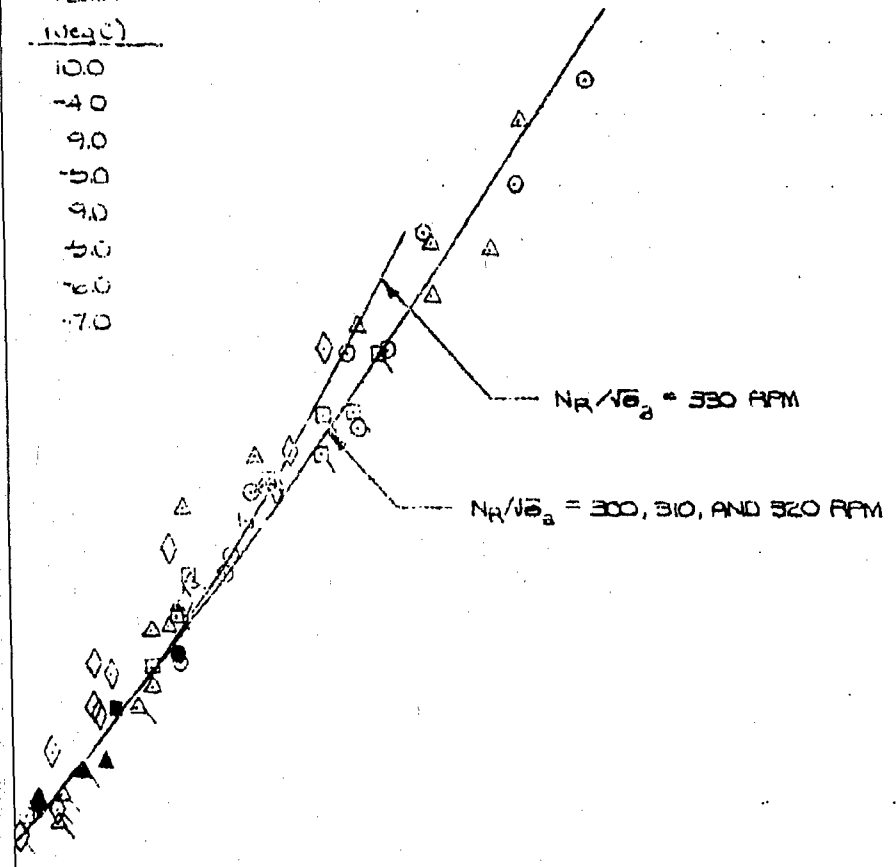


FIGURE 9 NONDIMENSIONAL HOVERING

1001 50 107 76
 1001 50 107 76
 CATEGORY II
 FLIGHT 107

FREE AIR
 TEMP
 (deg C)

10.0
 9.0
 8.0
 7.0
 6.0
 5.0
 4.0
 3.0
 2.0
 1.0
 0.0
 -1.0
 -2.0
 -3.0
 -4.0
 -5.0
 -6.0
 -7.0



EFFICIENT - $C_T \times 10^4$
 45 50 55 60 65

ENGINE PERFORMANCE

2

UH-1N USAF S/N 68-10
T400-CP-400 ENGINE
CATEGORY II
SKID HEIGHT = 15 FT

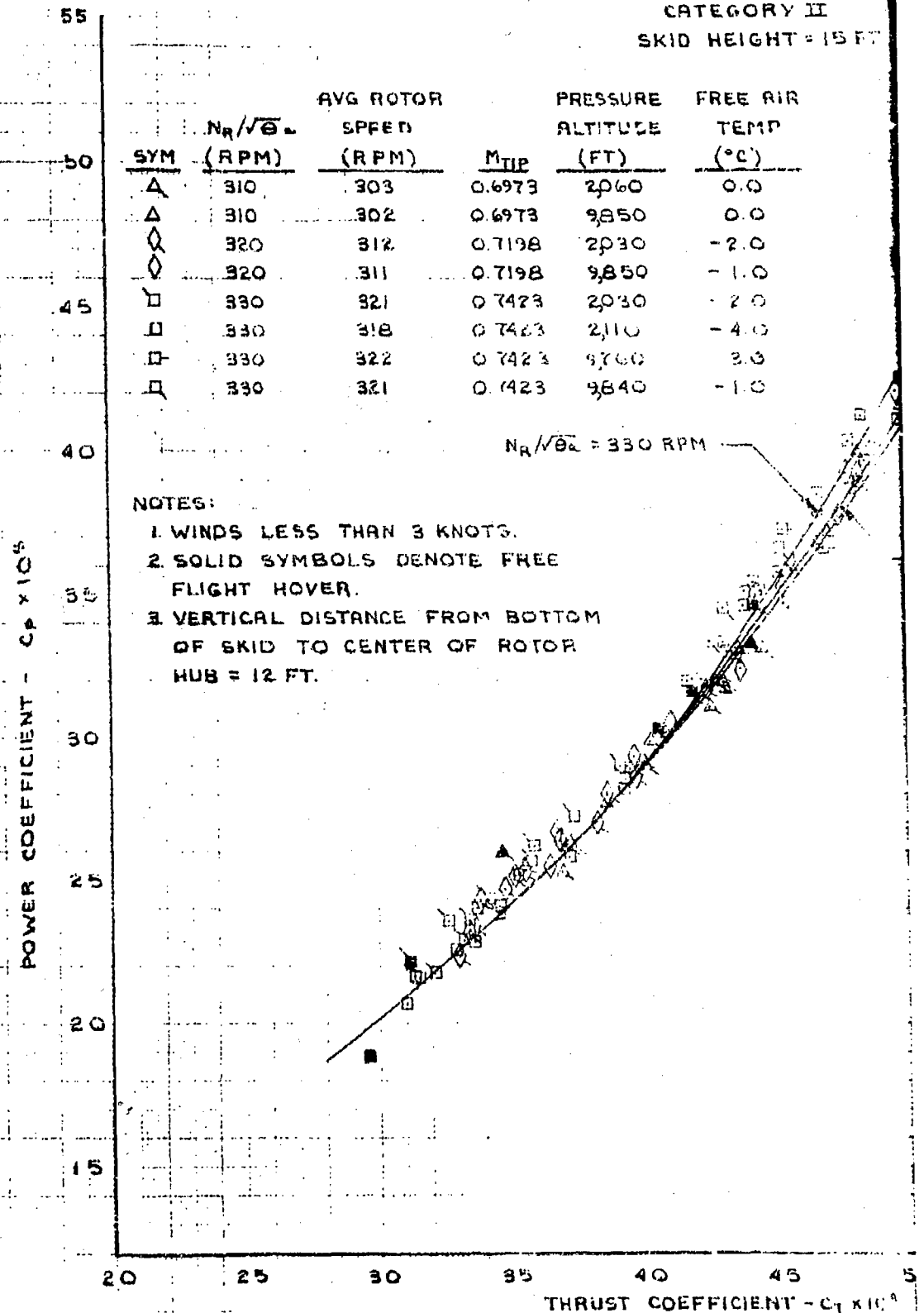
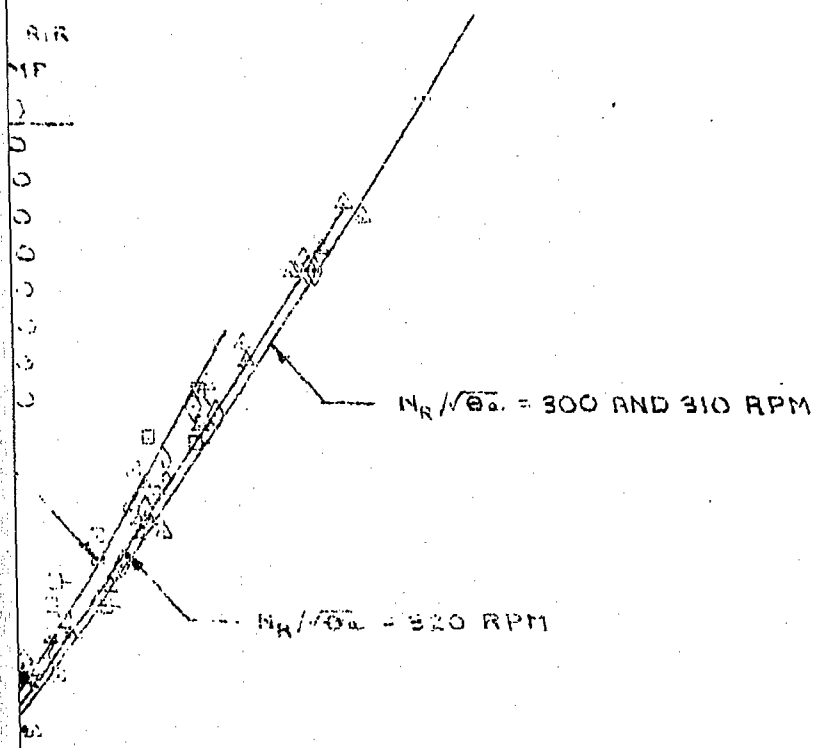


FIGURE 10 NONDIMENSIONAL HOVERING PER

RN 68 10776
 CO ENGINE
 PNY 11
 CNT = 15 FT



45 50 55 60 65

PERFORMANCE

UH-1H USAF S/N 6

1400-CP-400 CN

CATEGORY I

SKID HEIGHT = 2

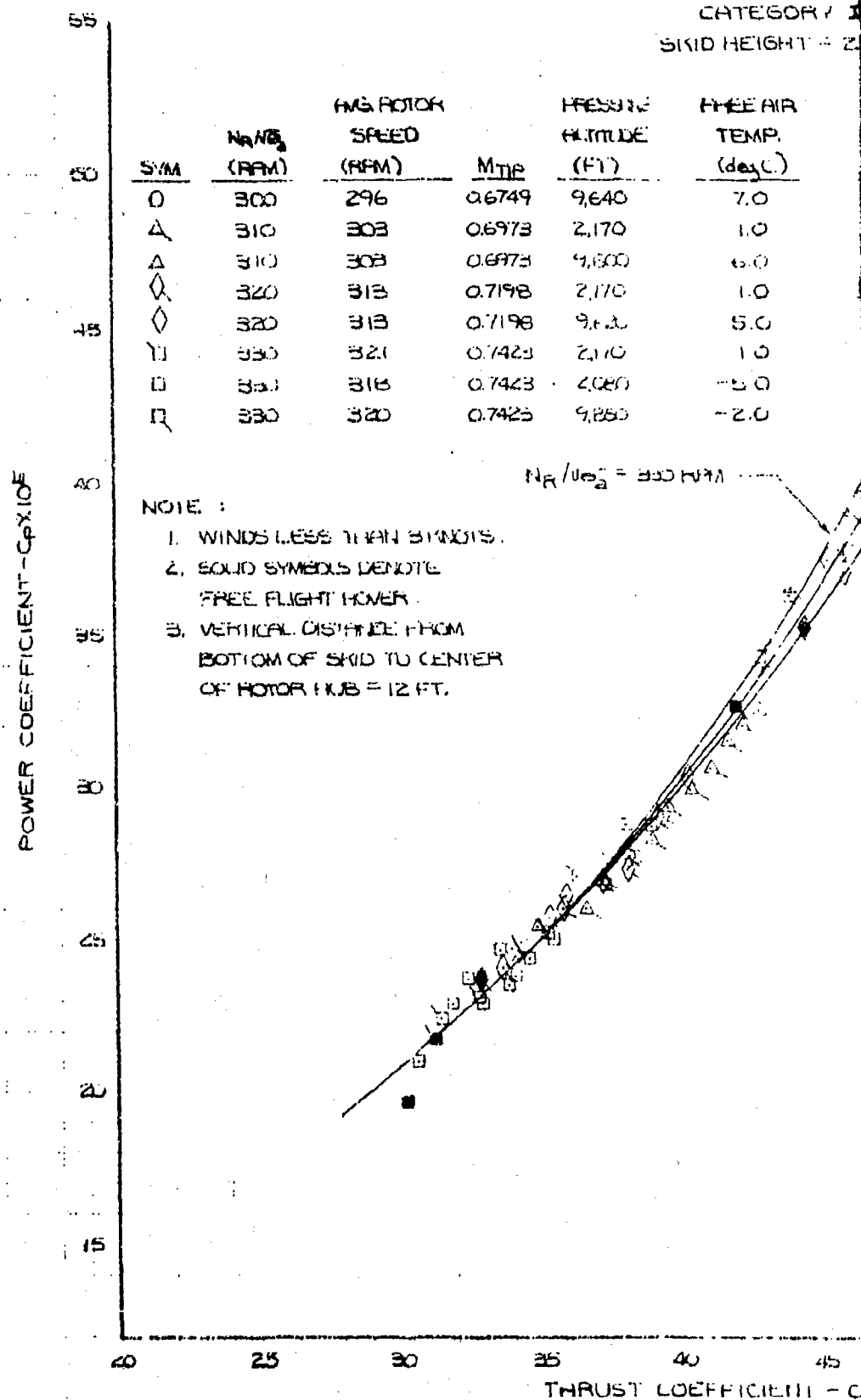


FIGURE 11 NONDIMENSIONAL HOVERING FLIGHT

1. 500 5 N 60 1076
 2. 400 ENGINE
 3. CATEGORY II
 4. HEIGHT = 25 FT

REL AIR

TEMP

(deg C)

7.0

10

50

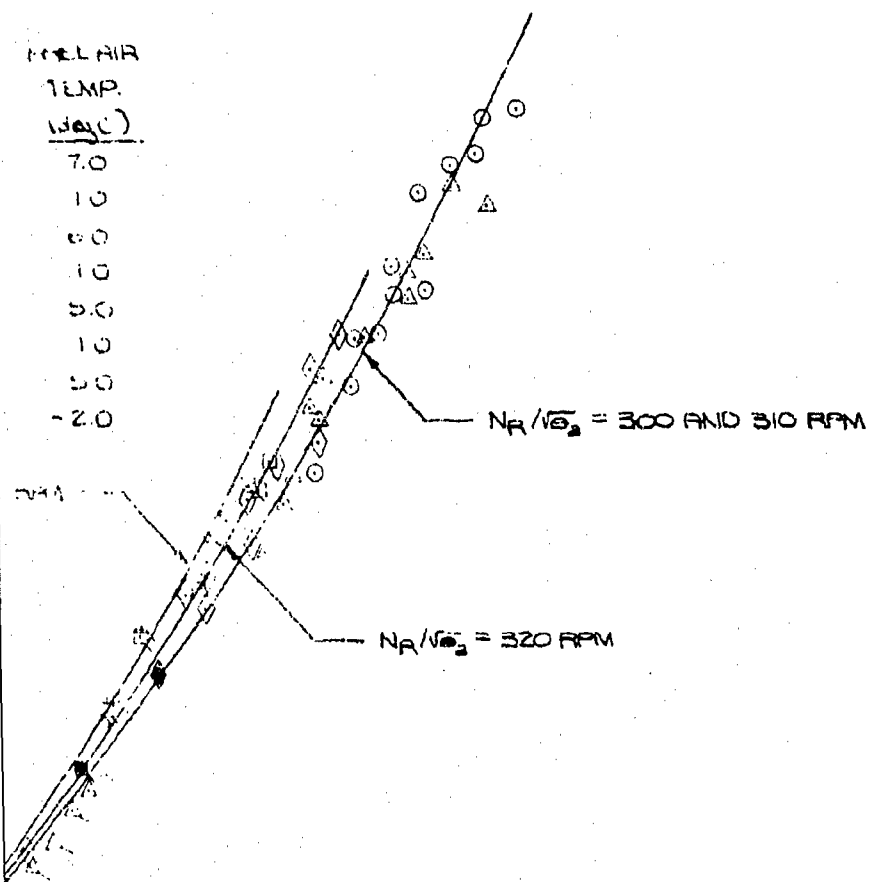
10

50

10

50

-2.0



45 50 55 60 65

PERCENT - $C_1/10^4$

OVERALL PERFORMANCE

UH-1N USARF S/N 68-107

T400-CP-400 ENGINE

CATEGORY II

SKID HEIGHT = 35 FT

| SYM | NAMES (RPM) | AVG MOTOR SPEED (RPM) | | MHP | PRESSURE | FREE AIR |
|-----|----------------|-----------------------------|-----|--------|------------------|-----------------|
| | | | | | ALTITUDE (FT) | TEMP (deg C) |
| 50 | Δ | 310 | 303 | 0.6973 | 2,190 | 2.0 |
| | Δ | 310 | 302 | 0.6973 | 2,860 | -1.0 |
| | ◇ | 320 | 312 | 0.7198 | 2,190 | 2.0 |
| | ◇ | 320 | 310 | 0.7198 | 2,820 | -1.0 |
| | □ | 330 | 321 | 0.7423 | 2,180 | 0.0 |
| | □ | 330 | 318 | 0.7423 | 2,080 | -5.0 |
| | □ | 330 | 320 | 0.7423 | 2,820 | -2.0 |
| | | | | | | |

POWER COEFFICIENT - C_PX10³

NOTES:

1. WINDLESS TRAN 34015.
2. SOLID SYMBOLS DENOTE FREE FLIGHT HOVER.
3. VERTICAL DISTANCE FROM BOTTOM OF SKID TO CENTER OF MOTOR HUB = 12 FT.

N_H/V₀² = 350 RPM

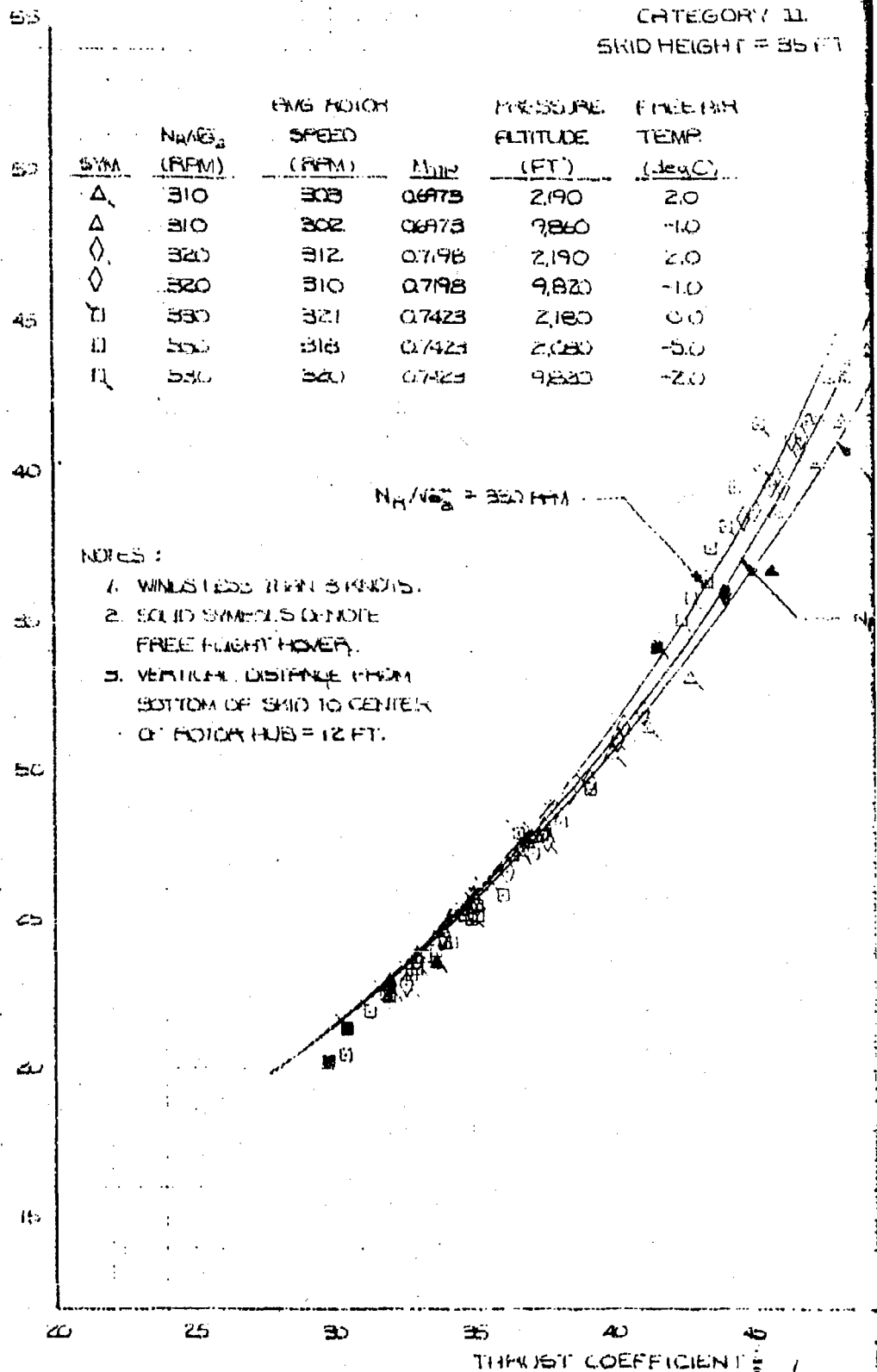
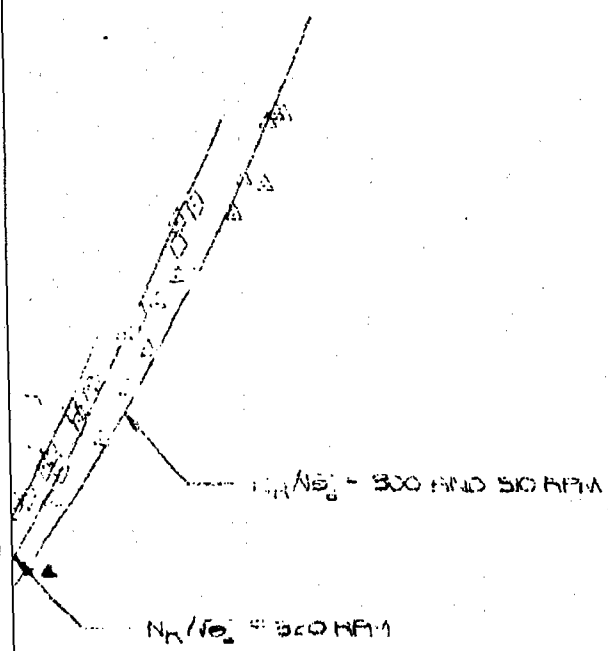


FIGURE 12 NONDIMENSIONAL HOVERING

1. 1000 170
 2. 1000 170
 3. 1000 170
 4. 1000 170



55 60 65

1. 1000 170
 2. 1000 170
 3. 1000 170
 4. 1000 170

UH-1H USARV
THRO CP-400
CATEGORY
SKID HEIGHT

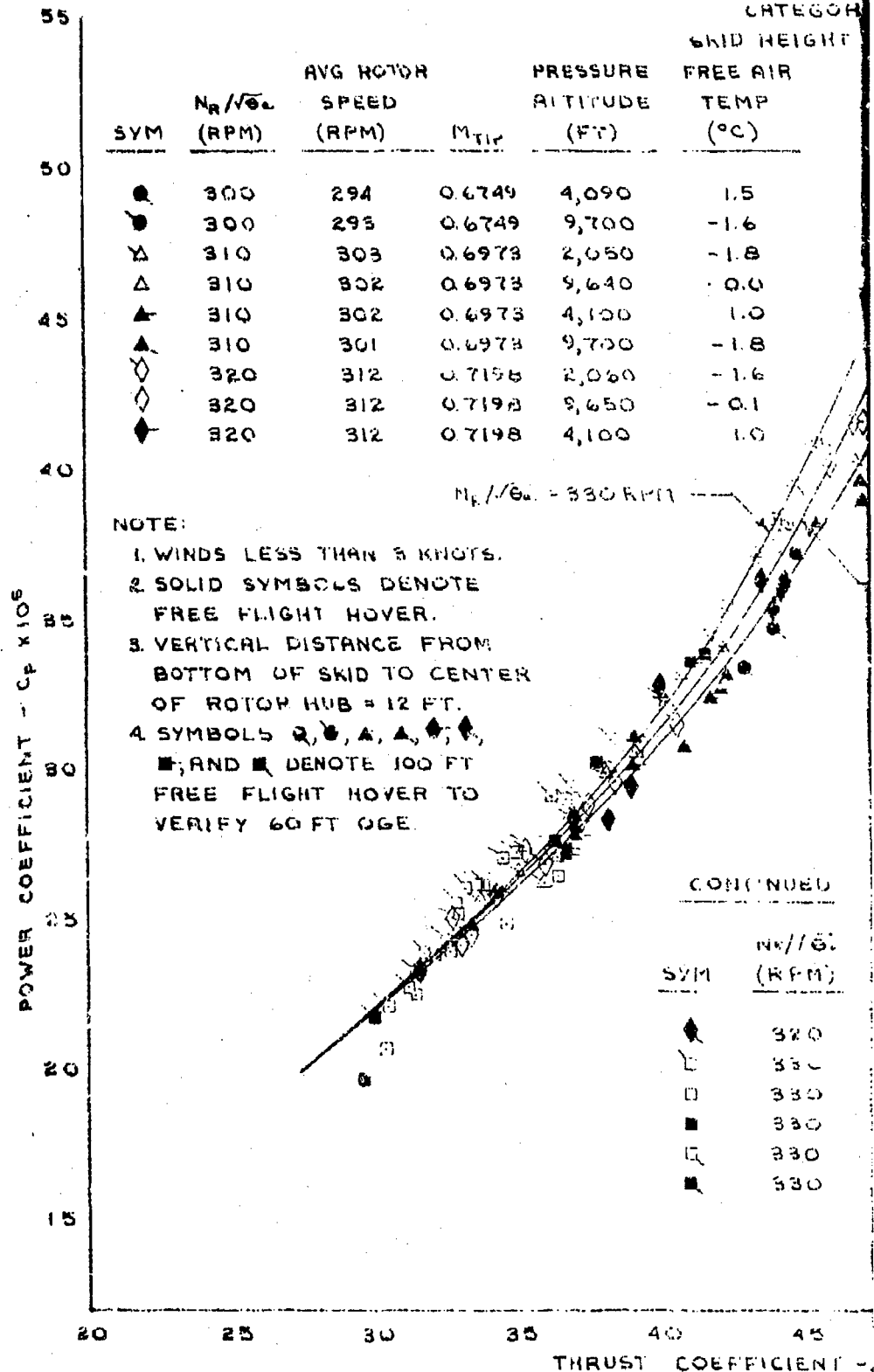


FIGURE 13 NONDIMENSIONAL HOVERING PERFO

U.S. AIR FORCE S.N. 68-10776

1400 CF 400 ENGINE

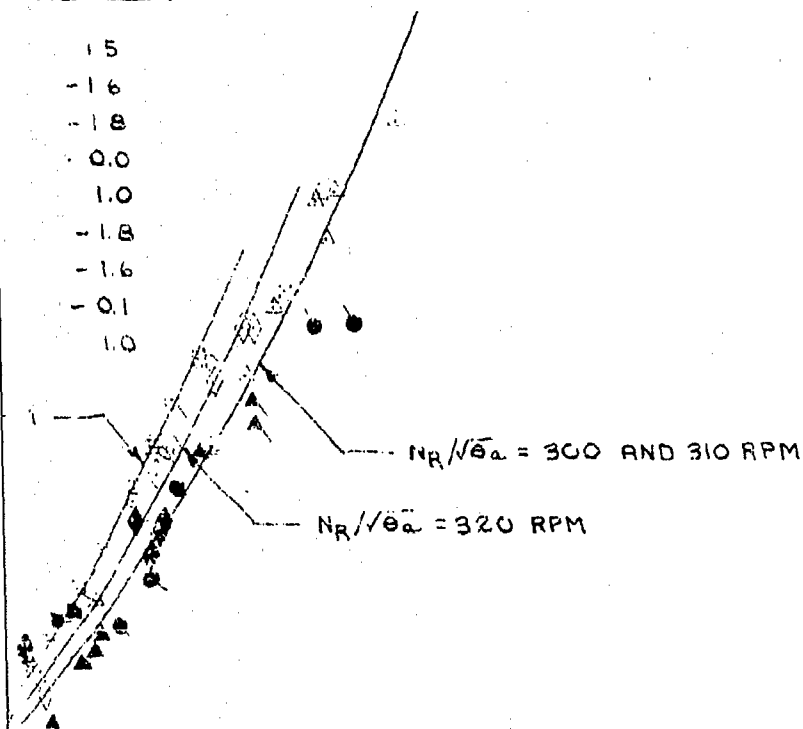
CATEGORY II

WIND HEIGHT = 60 FT

FREE AIR

TEMP

(°C)



CONTINUED

| S/M | $N_R/\sqrt{\theta_a}$ (RPM) | AVG ROTOR SPEED (RPM) | M_{TIP} | PRESSURE ALTITUDE (FT) | FREE AIR TEMP (°C) |
|-----|--------------------------------|-----------------------------|-----------|------------------------------|--------------------------|
| ◆ | 320 | 311 | 0.7198 | 9,690 | -2.0 |
| □ | 330 | 321 | 0.7423 | 2,060 | -2.0 |
| □ | 330 | 319 | 0.7423 | 2,100 | -5.0 |
| ■ | 330 | 322 | 0.7423 | 4,100 | 1.0 |
| □ | 330 | 321 | 0.7423 | 9,650 | 0.0 |
| ■ | 330 | 321 | 0.7423 | 9,690 | -2.0 |

45 50 55 60 65
EFFICIENT - $C_T \times 10^4$

PERFORMANCE

UH-1H USAF S/N 68-10776

T400-CP-400 ENGINE

CATEGORY II

SKID HEIGHT - 4 FT

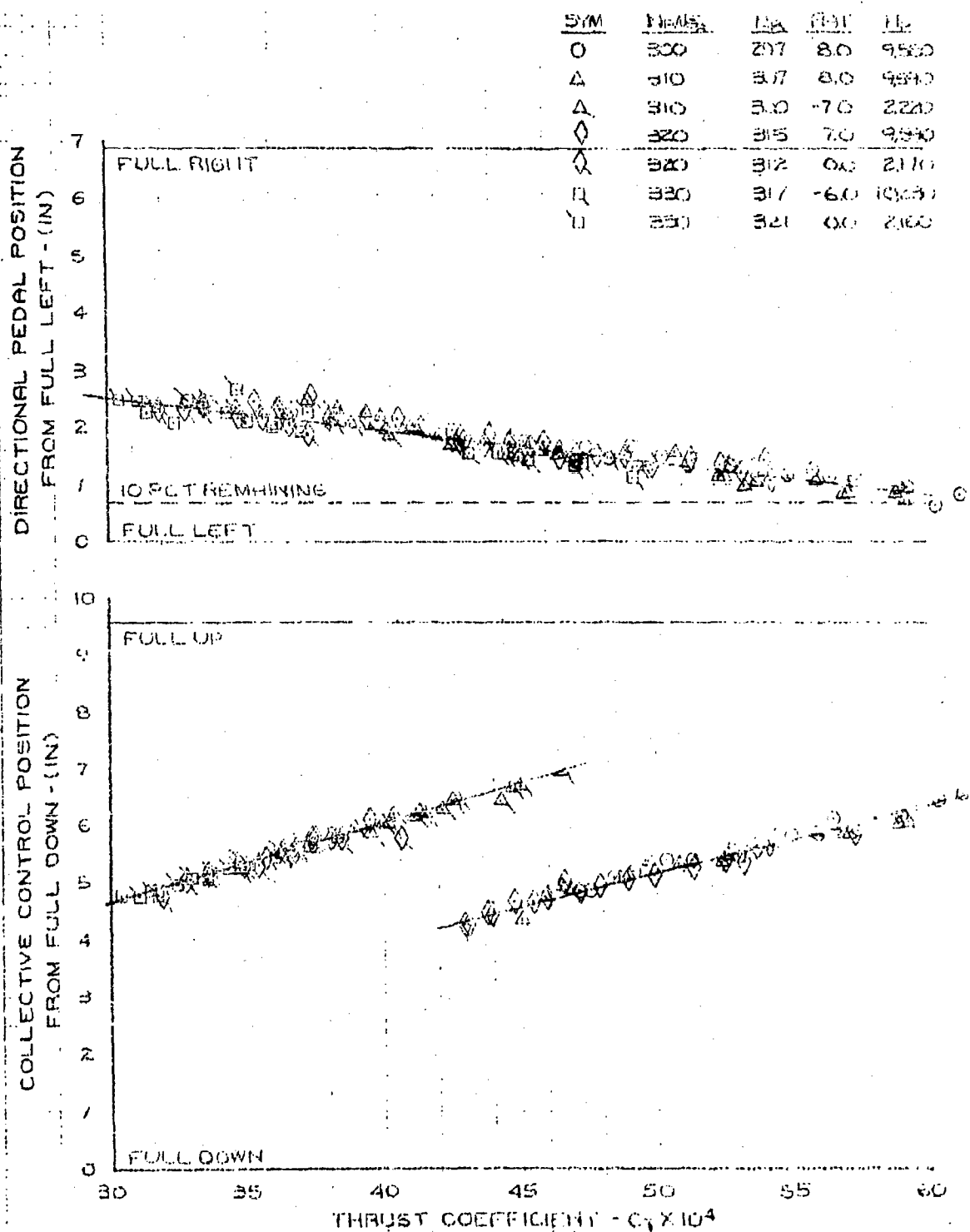
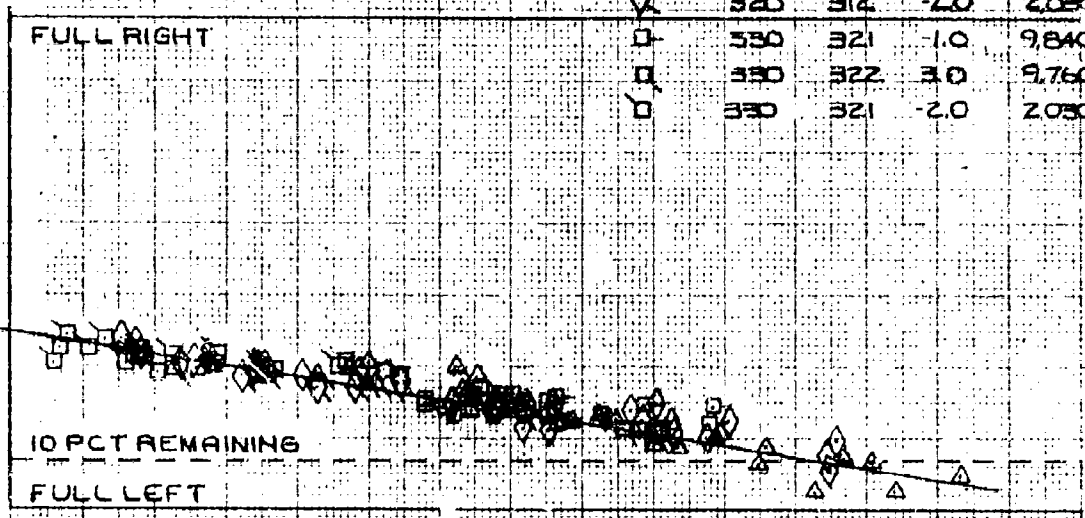


FIGURE 14 FLIGHT CONTROL POSITIONS IN HOVERING FLIGHT

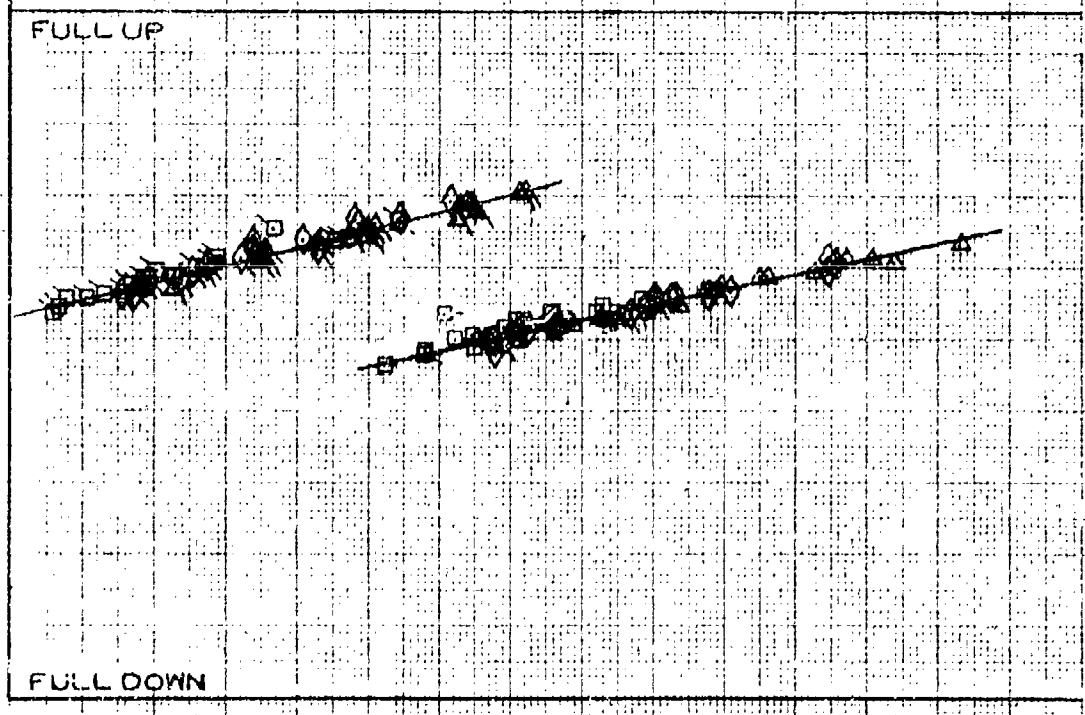
UH-1N USARF SIN 65-10778
 T400-CP-400 ENGINE
 CATEGORY II
 SKID HEIGHT - 15 FT

| SYM | N ₁ /AS | N ₂ | FRT | H ₀ |
|-----|--------------------|----------------|------|----------------|
| △ | 310 | 302 | 0.0 | 9850 |
| △ | 310 | 303 | 0.0 | 2060 |
| ◇ | 320 | 311 | -1.0 | 9850 |
| ◇ | 320 | 312 | -2.0 | 2060 |
| □ | 330 | 321 | -1.0 | 9840 |
| □ | 330 | 322 | 3.0 | 9760 |
| □ | 330 | 321 | -2.0 | 2030 |

DIRECTIONAL PEDAL POSITION
 FROM FULL LEFT - (IN)



COLLECTIVE CONTROL POSITION
 FROM FULL DOWN - (IN)



THRUST COEFFICIENT - $C_T \times 10^4$

FIGURE 15. FLIGHT CONTROL POSITIONS IN HOVERING FLIGHT

UH-1N USAF S/N 68-10776
 T400-CP-400 ENGINE
 CATEGORY II
 SKID HEIGHT - 25 FT

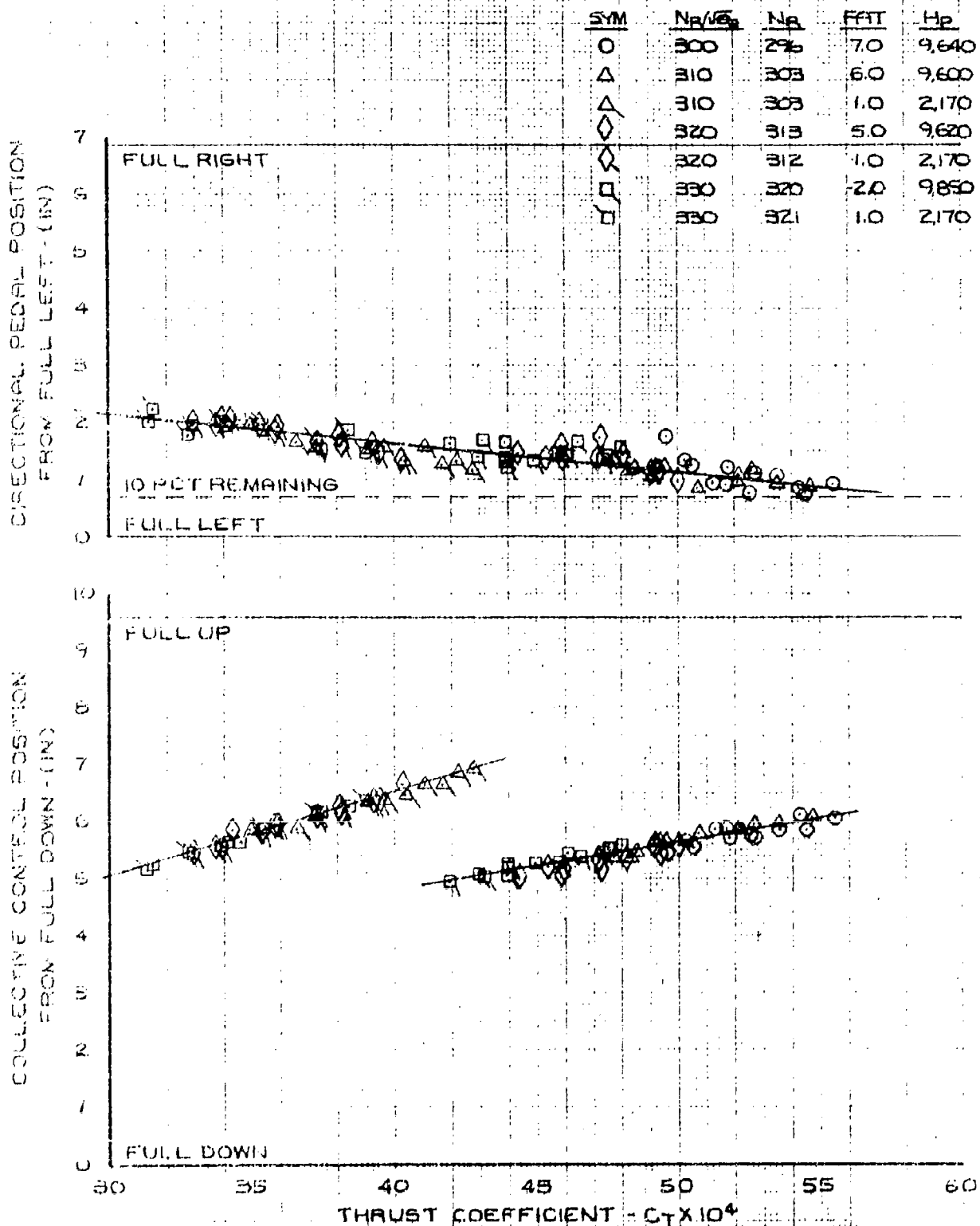


FIGURE 16 FLIGHT CONTROL POSITIONS IN HOVERING FLIGHT

UH-1N USAF S/N 58-10775
 T400-CF-400 E GINE
 CATEGORY 10
 SKID HEIGHT - 6.1 FT

| SYM | N ₁ /N ₂ | N ₁ | FAT | H ₀ |
|-----|--------------------------------|----------------|------|----------------|
| △ | 310 | 302 | 0.0 | 9640 |
| △ | 310 | 303 | -2.0 | 2050 |
| ◇ | 320 | 312 | 0.0 | 9650 |
| ◇ | 320 | 312 | -2.0 | 2060 |
| □ | 330 | 321 | 0.0 | 9650 |
| □ | 330 | 321 | -2.0 | 2060 |

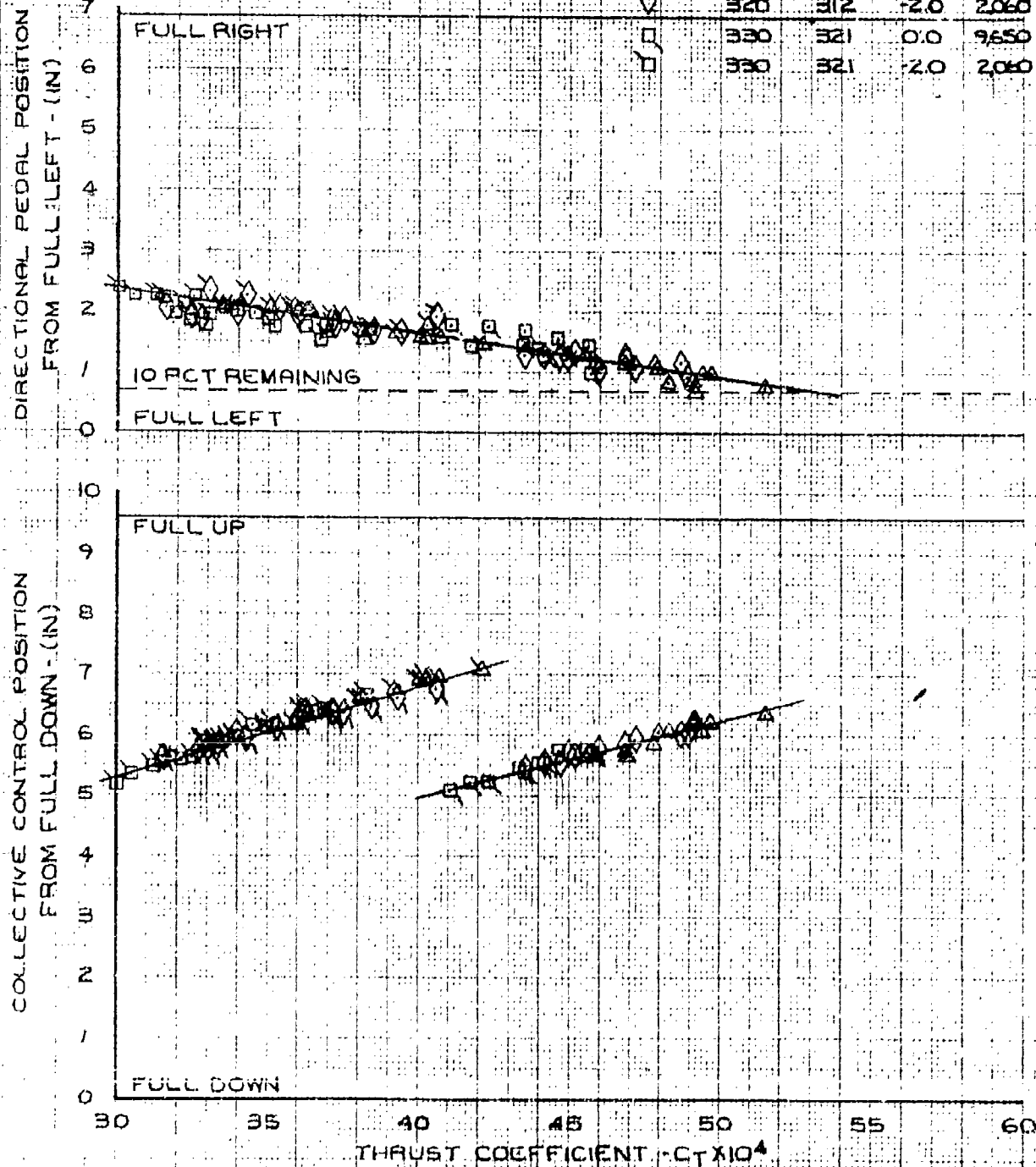


FIGURE 17 FLIGHT CONTROL POSITIONS IN HOVERING FLIGHT

UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

TECHNIQUE
LEVEL ACCELERATION FROM A 4-FT HOVER -
WITHOUT ROTOR SPEED BLEED

NOTE 1

1. CURVES DERIVED FROM FIGURES 19 THROUGH 21
2. DO NOT EXTRAPOLATE DATA

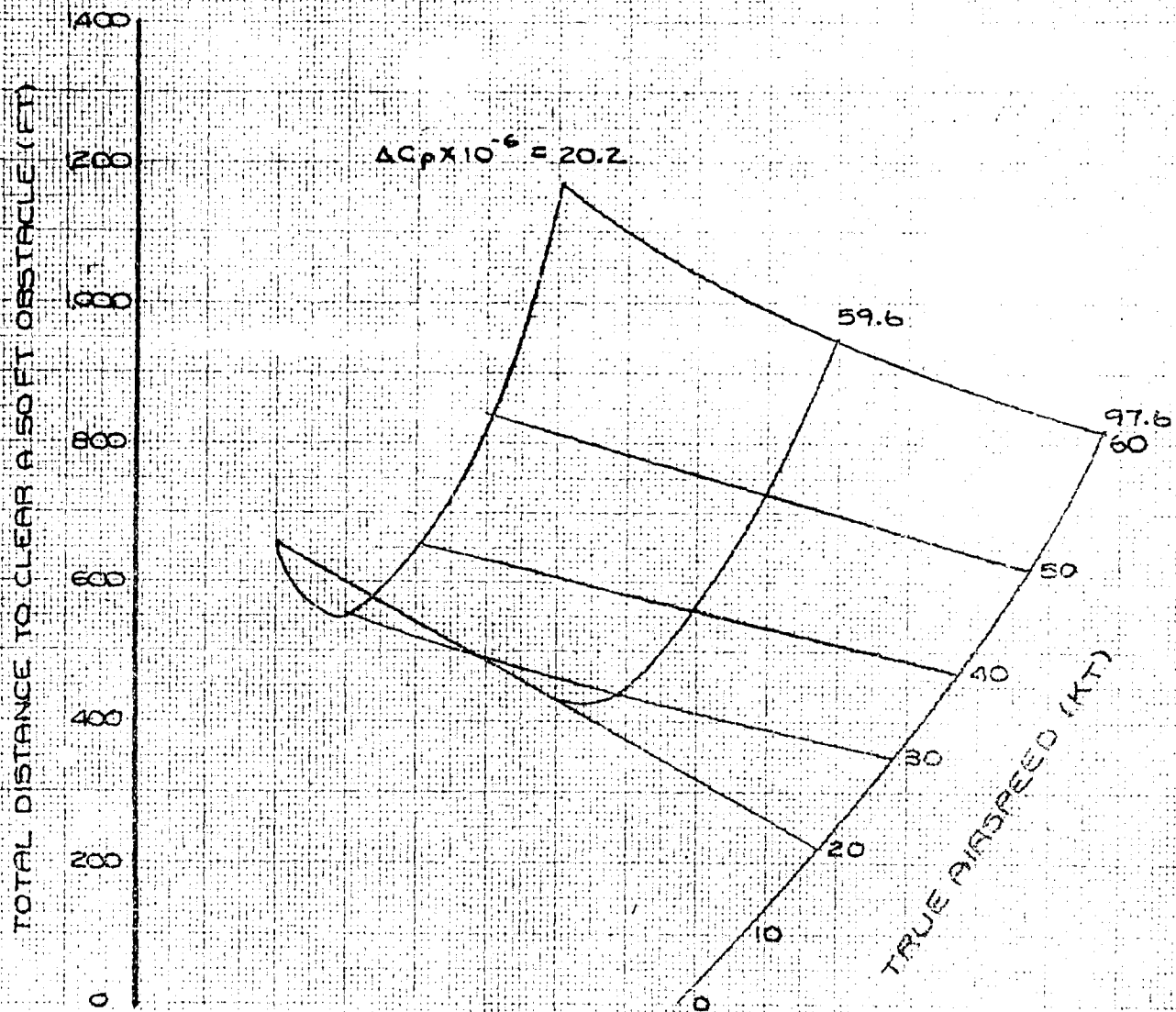


FIGURE 18 NONDIMENSIONAL TAKEOFF PERFORMANCE

UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

TECHNIQUE: LEVEL ACCELERATION FROM A 4-FT HOVER -
WITHOUT ROTOR SPEED BLEED

$$\Delta C_p = 20.2 \times 10^{-6}$$

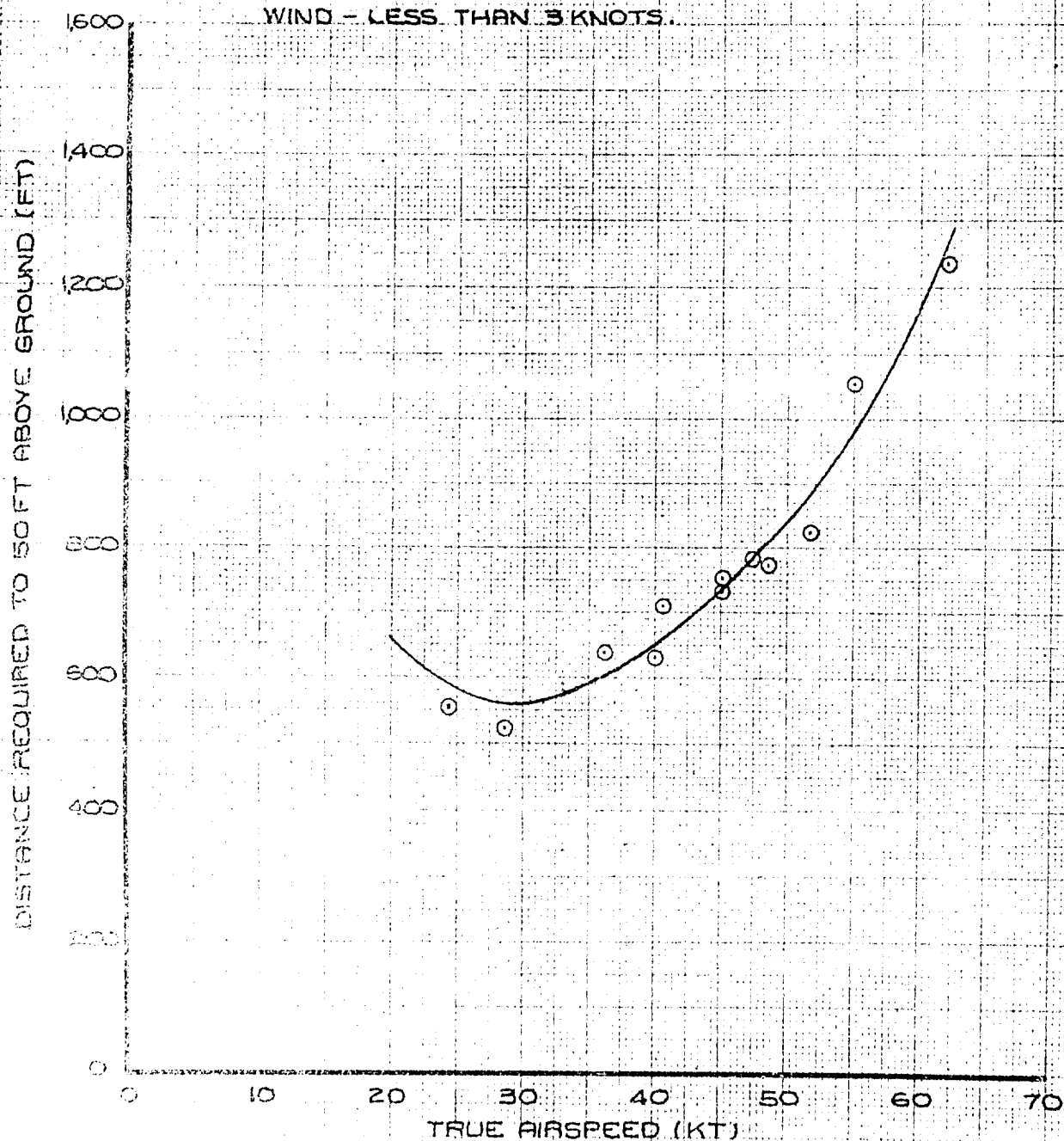
ROTOR SPEED (RPM) = 324

GROSS WEIGHT (LB) = 10,420

PRESSURE ALTITUDE (FT) = 9,640

FREE AIR TEMPERATURE (deg C) = 11.0

WIND - LESS THAN 3 KNOTS.



UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

TECHNIQUE: LEVEL ACCELERATION FROM A 4-FT HOVER -
WITHOUT ROTOR SPEED BLEED

$$\Delta C_p = 59.6 \times 10^{-6}$$

ROTOR SPEED (RPM) = 324

GROSS WEIGHT (LB) = 9,990

PRESSURE ALTITUDE (FT) = 9,520

FREE AIR TEMPERATURE (deg C) = 9.0

WIND - LESS THAN 1.5 KT

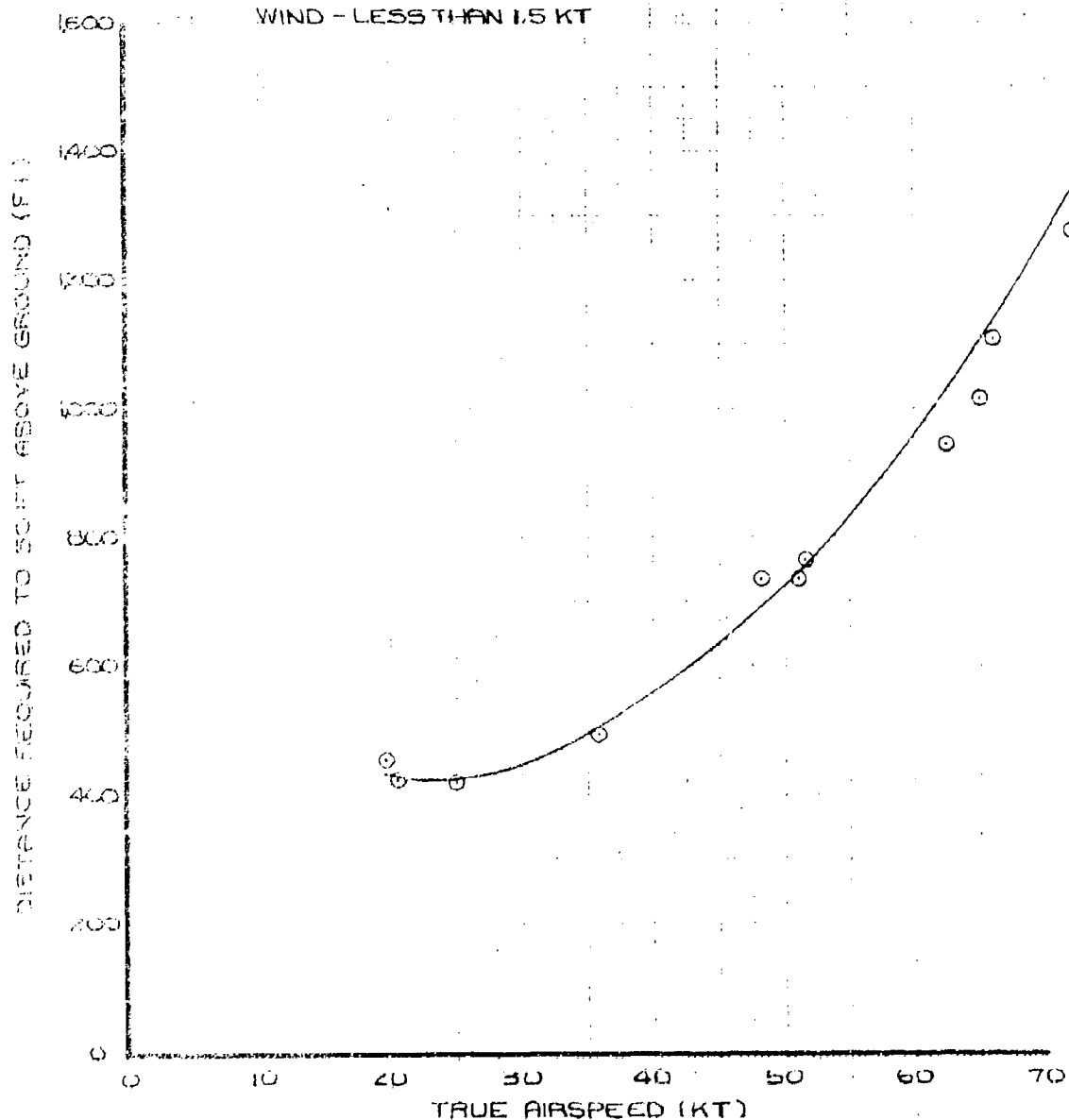


FIGURE 20 TAKEOFF DISTANCE REQUIRED TO CLEAR A 50-FT OBSTACLE

UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

TECHNIQUE: LEVEL ACCELERATION FROM A 4-FT HOVER -
WITHOUT ROTOR SPEED BLEED

$$\Delta C_p = 97.6 \times 10^{-6}$$

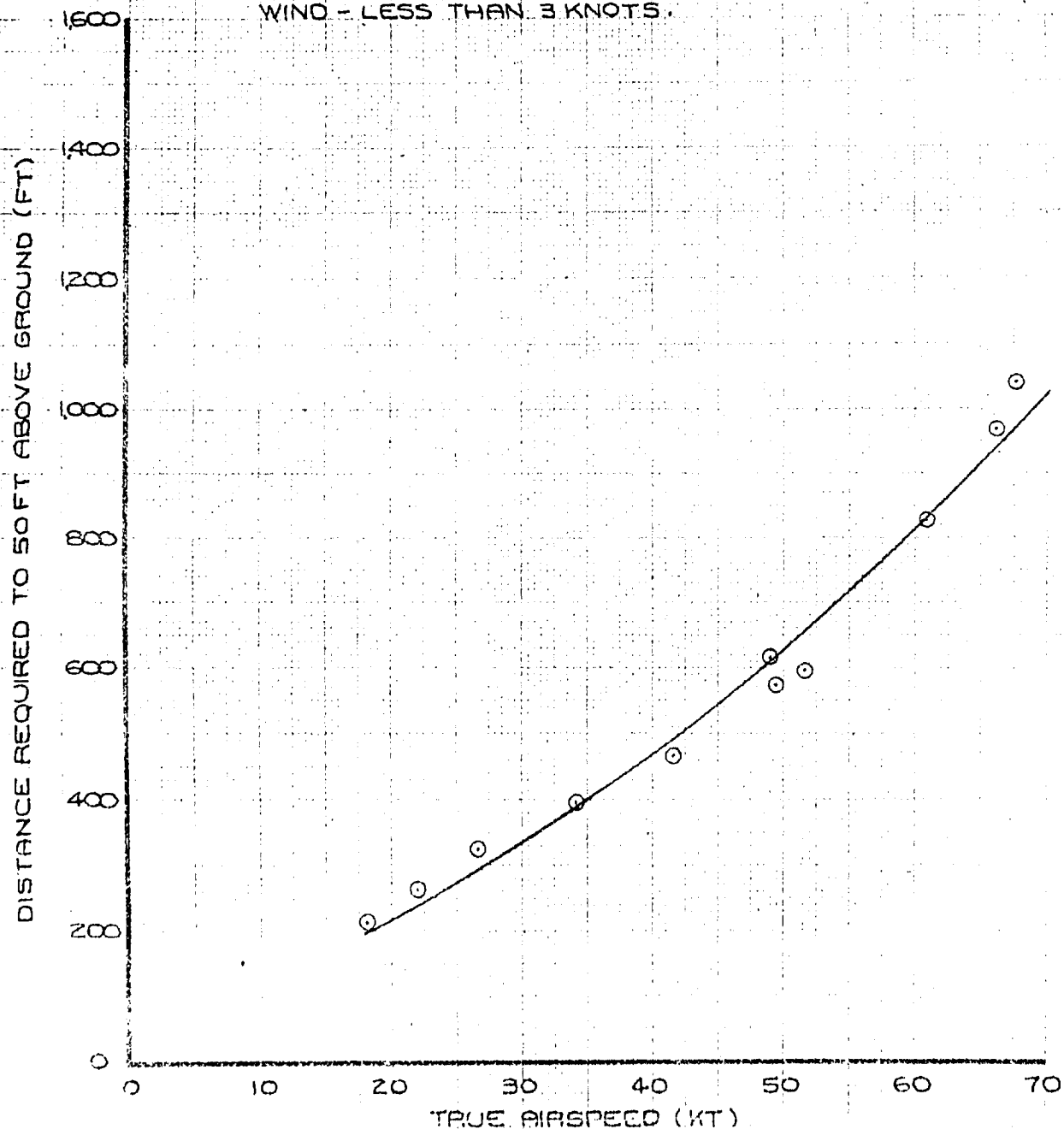
ROTOR SPEED (RPM) = 324

GROSS WEIGHT (LB) = 9,480

PRESSURE ALTITUDE (FT) = 9,720

FREE AIR TEMPERATURE (deg C) = 6.0

WIND - LESS THAN 3 KNOTS.



UH-1N USAF S/N 68-10776
T400-CA-400 ENGINE
CATEGORY II

TECHNIQUE

LEVEL ACCELERATION FROM A 4-FT HOVER -
WITH ROTOR SPEED BLEED

NOTE :

1. CURVES DERIVED FROM FIGURES 23 THROUGH 25
2. DO NOT EXTRAPOLATE THESE DATA

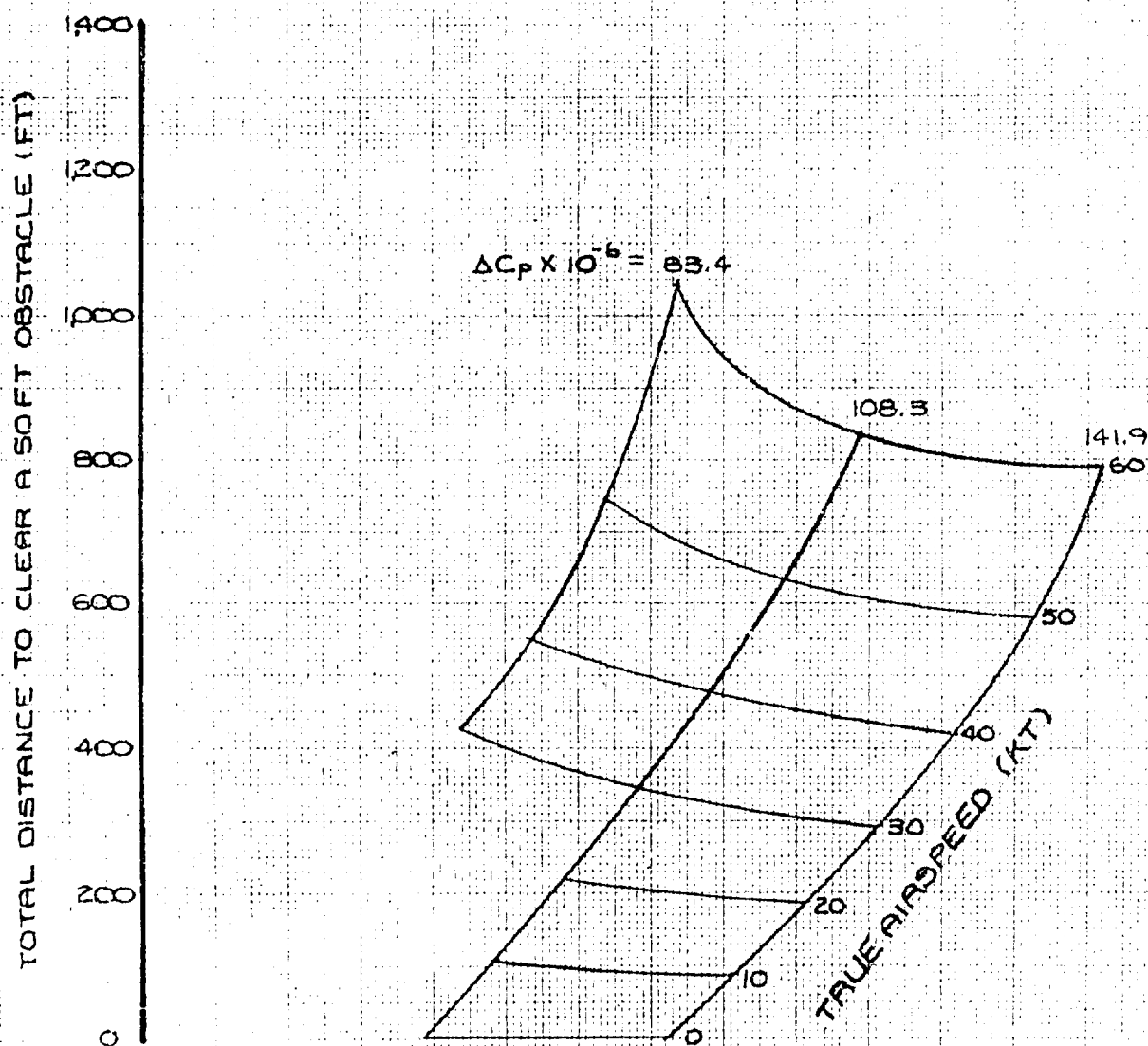


FIGURE 22 NONDIMENSIONAL TAKEOFF PERFORMANCE

UH-1N USAF S/N 68-10776
 T400-CP-400 ENGINE
 CATEGORY II

TECHNIQUE: LEVEL ACCELERATION FROM A 4-FT HOVER -
 WITH ROTOR SPEED BLEED

$\Delta C_p = 83.4 \times 10^{-6}$

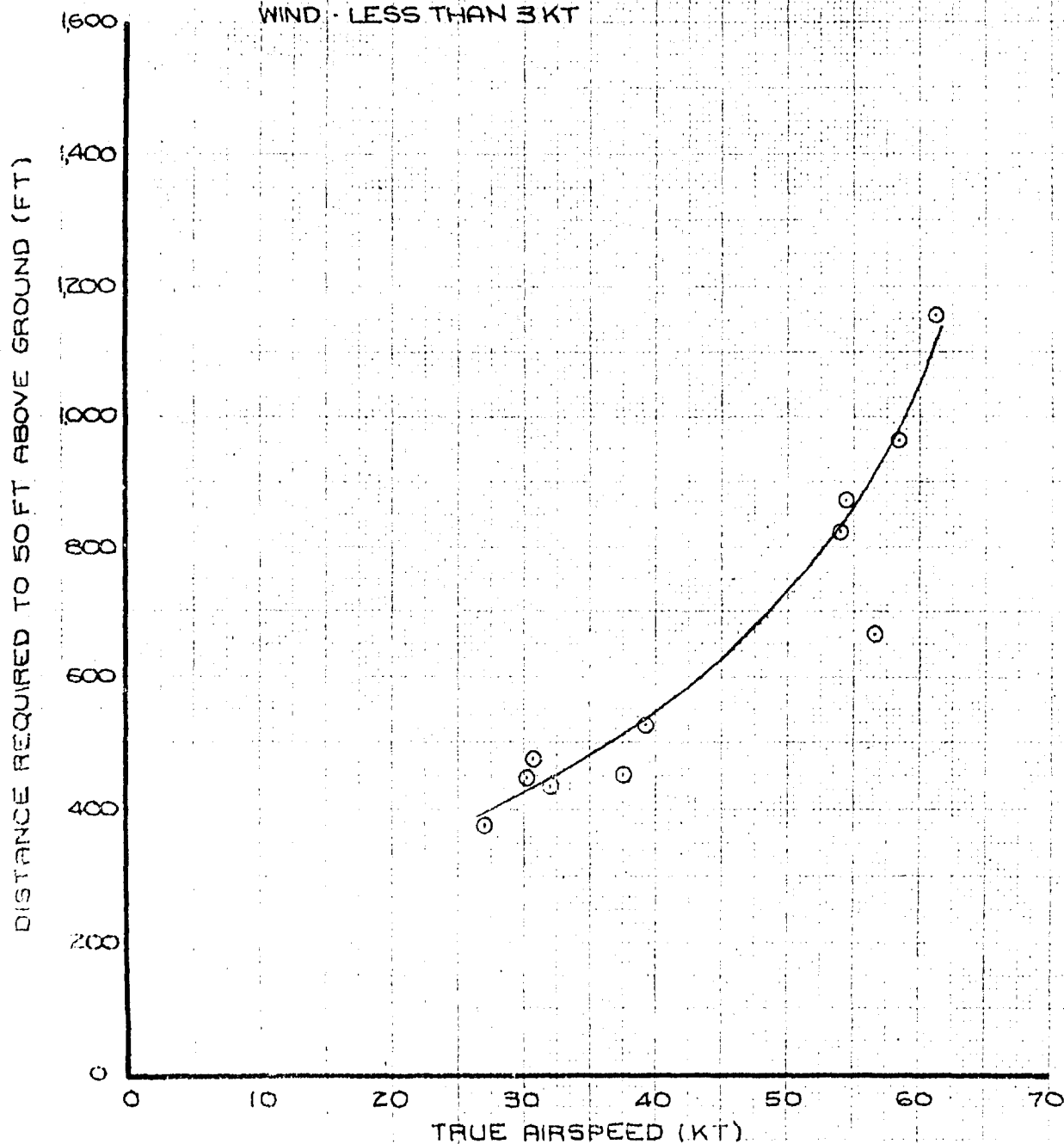
ROTOR SPEED (RPM) = 324-314

GROSS WEIGHT (LB) = 10,410

PRESSURE ALTITUDE (FT) = 9,470

FREE AIR TEMPERATURE (deg C) 58.0

WIND - LESS THAN 3 KT



UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

TECHNIQUE: LEVEL ACCELERATION FROM A 4-FT HOVER -
WITH ROTOR SPEED BLEED

$$\Delta C_p = 108.3 \times 10^{-6}$$

ROTOR SPEED (RPM) = 324 - 314

GROSS WEIGHT (LB) = 9,970

PRESSURE ALTITUDE (FT) = 9,550

FREE AIR TEMPERATURE (deg C) = 7.0

WIND - LESS THAN 3 KNOTS.

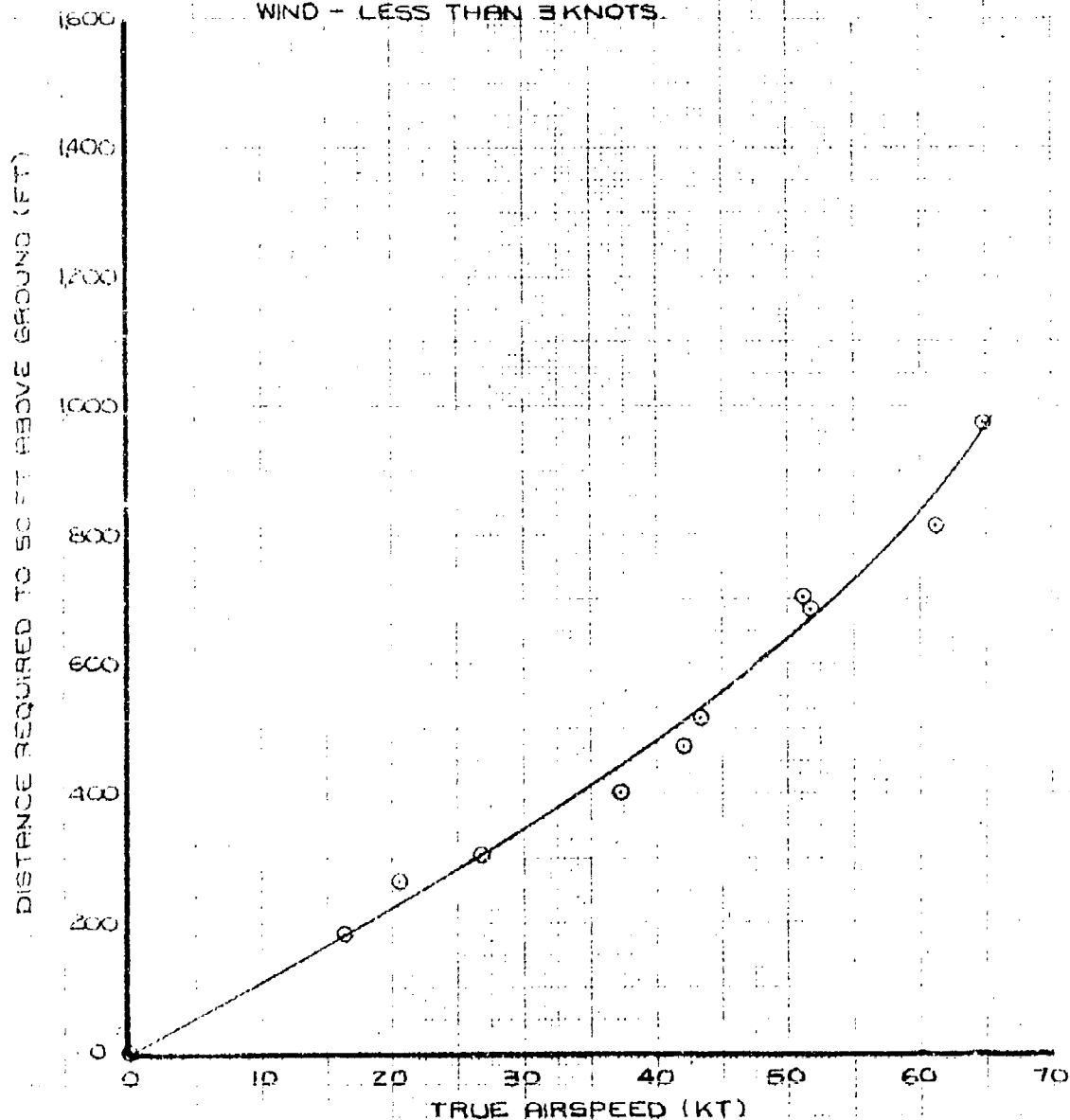
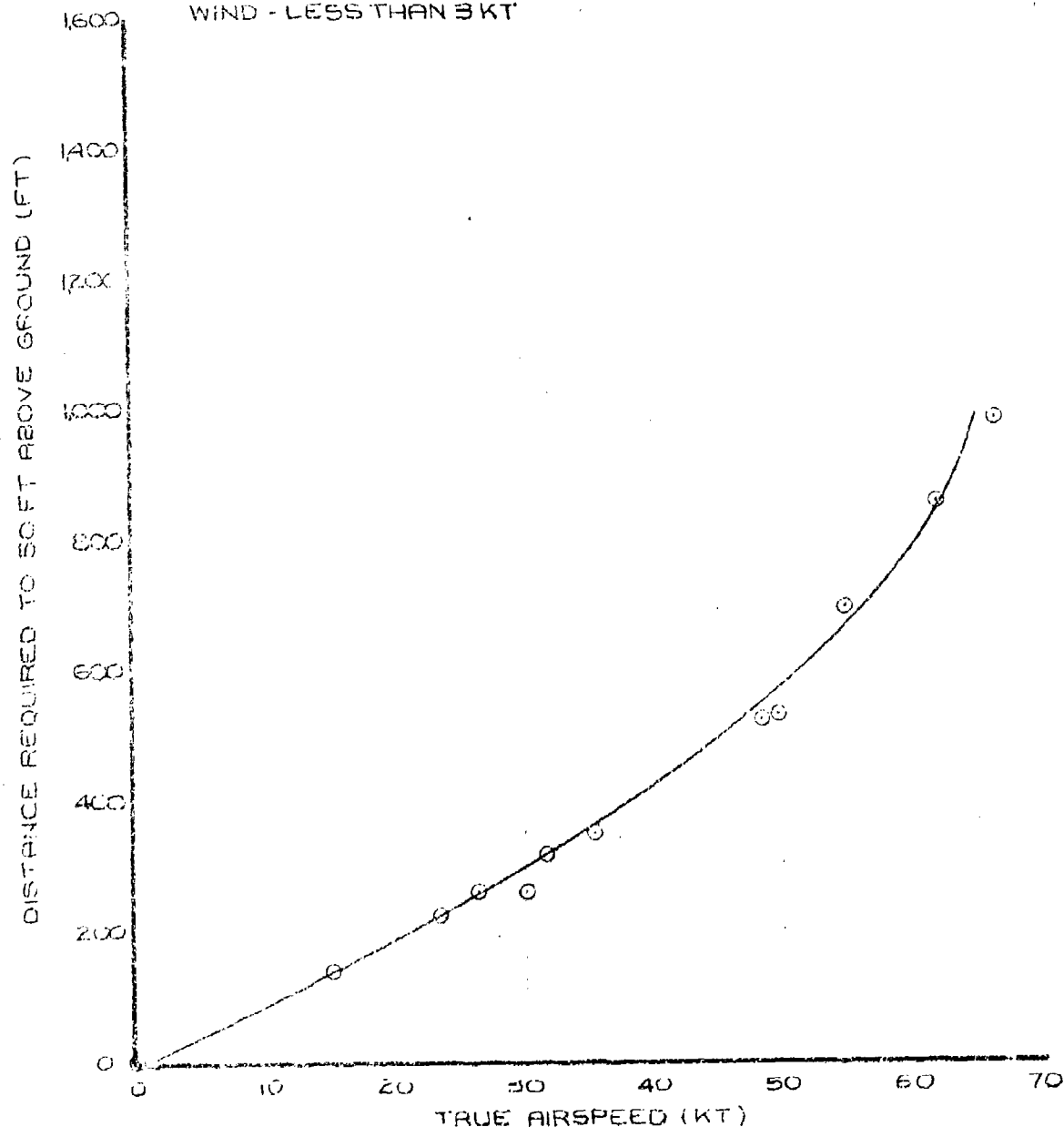


FIGURE 24 TAKEOFF DISTANCE REQUIRED TO CLEAR A 50-FT OBSTACLE 39

UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

TECHNIQUE : LEVEL ACCELERATION FROM A 4-FT HOVER --
WITH ROTOR SPEED BLEED

$\Delta C_p = 141.9 \times 10^{-6}$
ROTOR SPEED (RPM) = 324-314
GROSS WEIGHT (LB) = 9,430
PRESSURE ALTITUDE (FT) = 9,520
FREE AIR TEMPERATURE (deg C) = 7.0
WIND - LESS THAN 3 KT



UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

TECHNIQUE
CLIMB AND ACCELERATION FROM LIGHT ON SKIDS -
WITHOUT ROTOR SPEED BLEED

NOTE :

1. CURVES DERIVED FROM FIGURE 27 THROUGH 29
2. DO NOT EXTRAPOLATE THESE DATA
3. ΔC_P BASED ON POWER AVAILABLE LESS POWER
REQUIRED TO HOVER AT 4 FT SKID HEIGHT

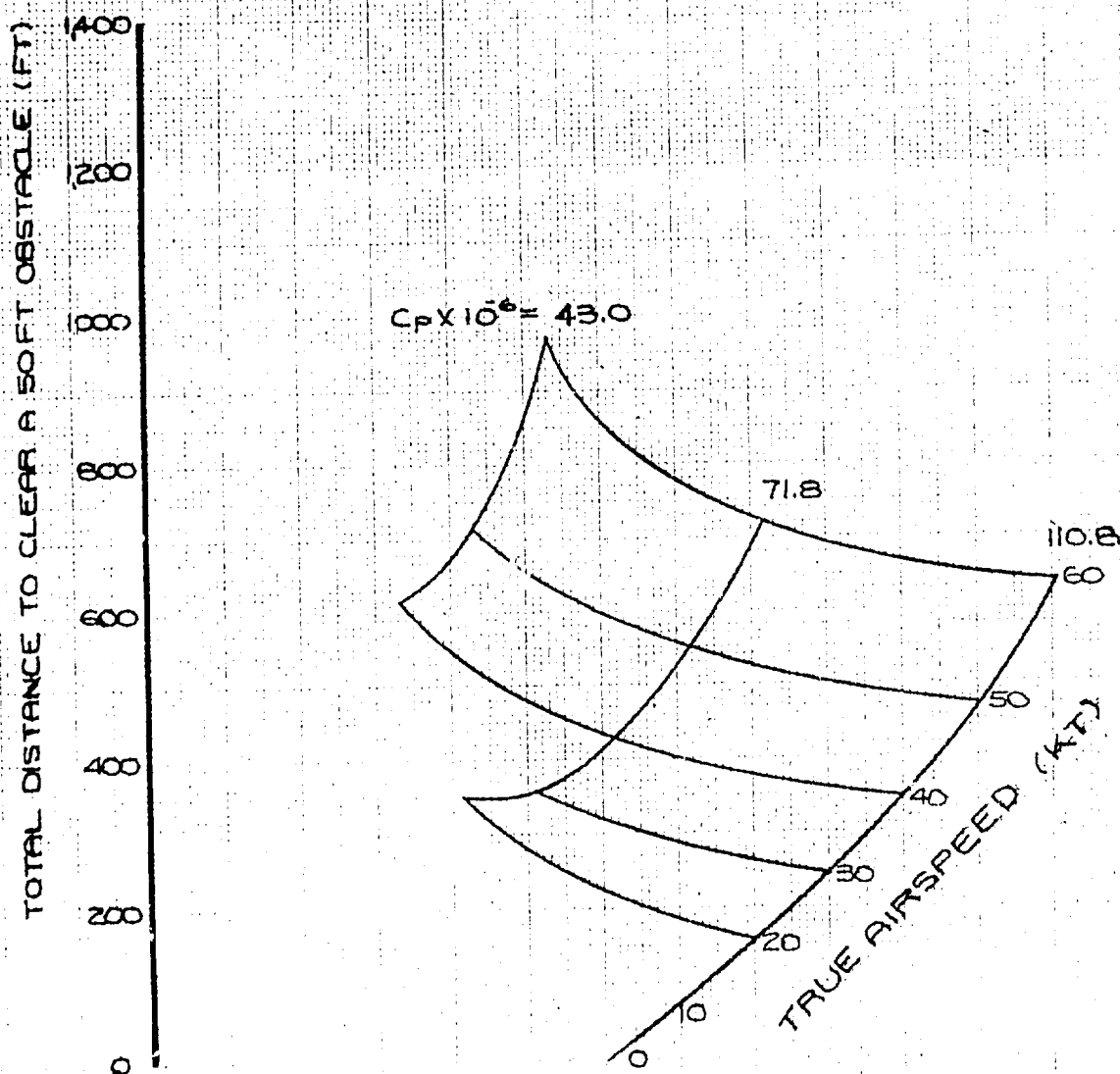


FIGURE 26 NONDIMENSIONAL TAKEOFF PERFORMANCE

UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

TECHNIQUE: CLIMB AND ACCELERATION FROM LIGHT ON SKIDS -
WITHOUT ROTOR SPEED BLEED

$$\Delta C_p = 1.43 \times 10^{-6}$$

ROTOR SPEED (RPM) = 324

GROSS WEIGHT (LB) = 10420

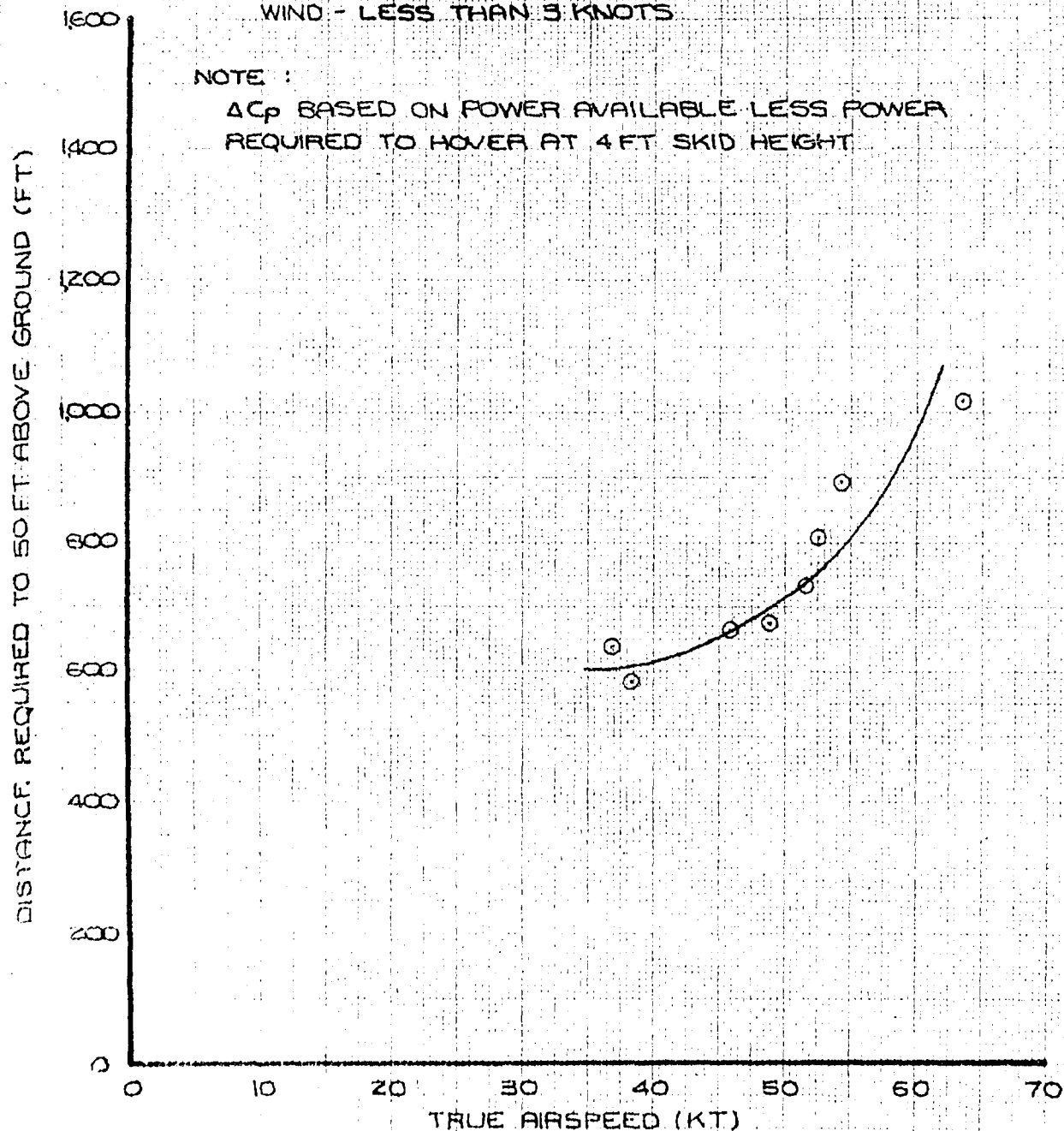
PRESSURE ALTITUDE (FT) = 9340

FREE AIR TEMPERATURE (deg C) = 8.0

WIND - LESS THAN 3 KNOTS

NOTE :

ΔC_p BASED ON POWER AVAILABLE LESS POWER
REQUIRED TO HOVER AT 4 FT SKID HEIGHT



UH-1H USAF S/N 68-10776
 T400-CP-400 ENGINE
 CATEGORY II

TECHNIQUE : CLIMB AND ACCELERATION FROM LIGHT ON SKIDS -
 WITHOUT ROTOR SPEED BLEED

$\Delta C_p = 71.8 \times 10^{-6}$
 ROTOR SPEED (RPM) = 324
 GROSS WEIGHT (LB) = 9960
 PRESSURE ALTITUDE (FT) = 9340
 FREE AIR TEMPERATURE (deg C) = 12.0
 WIND - LESS THAN 3 KNOTS

NOTE :

ΔC_p BASED ON POWER AVAILABLE LESS POWER
 REQUIRED TO HOVER AT 4 FT SKID HEIGHT

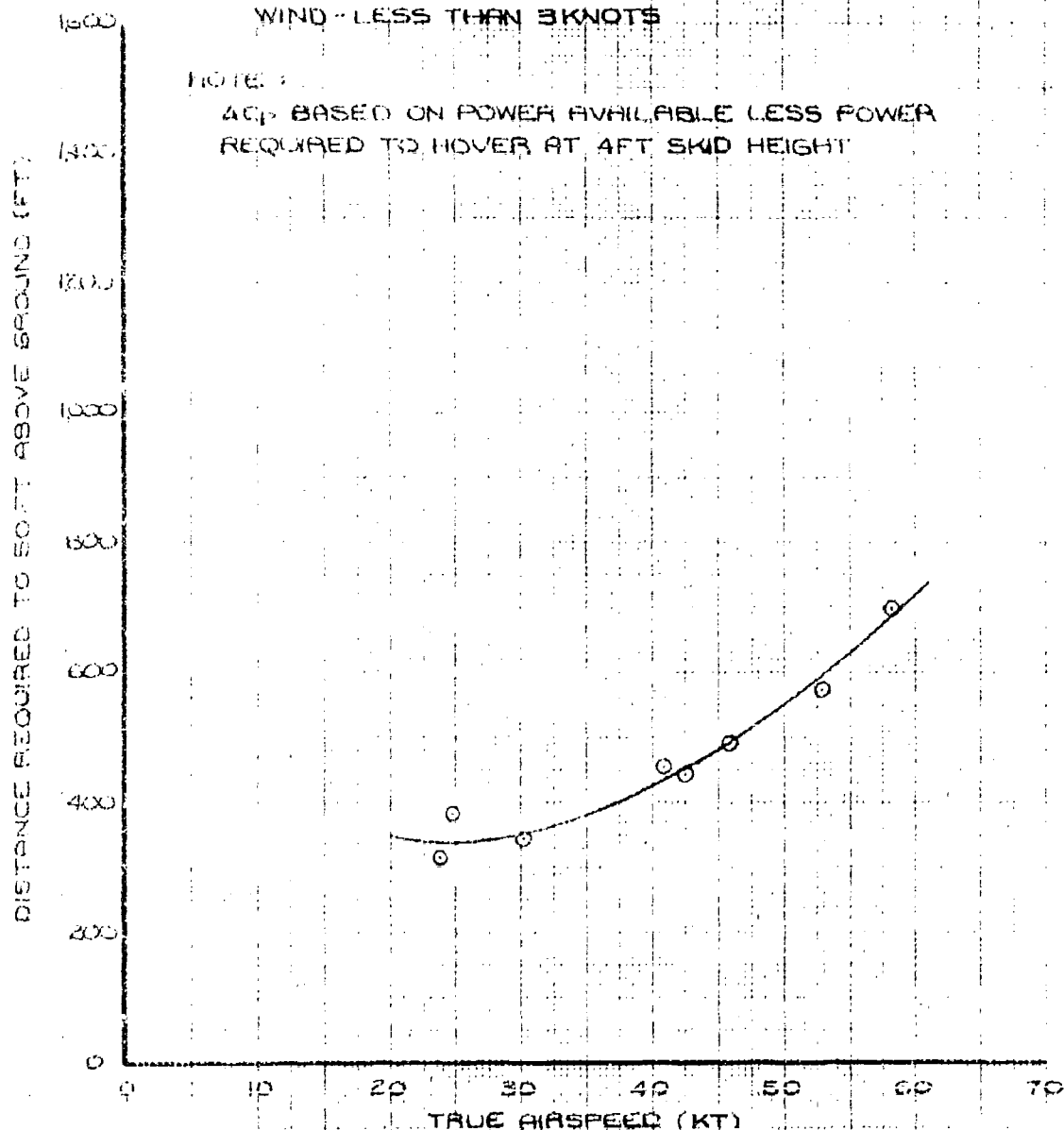


FIGURE 28 TAKEOFF DISTANCE REQUIRED TO CLEAN A 50-FT OBSTACLE 43

UH-1H USAF SN 68-10776

T400-CP-400 ENGINE

CATEGORY II

TECHNIQUE: CLIMB AND ACCELERATION FROM LIGHT ON SKIDS -
WITHOUT ROTOR SPEED BLEED

$\Delta C_P = 110.8 \times 10^{-6}$

ROTOR SPEED (RPM) = 324

GROSS WEIGHT (LB) = 9410

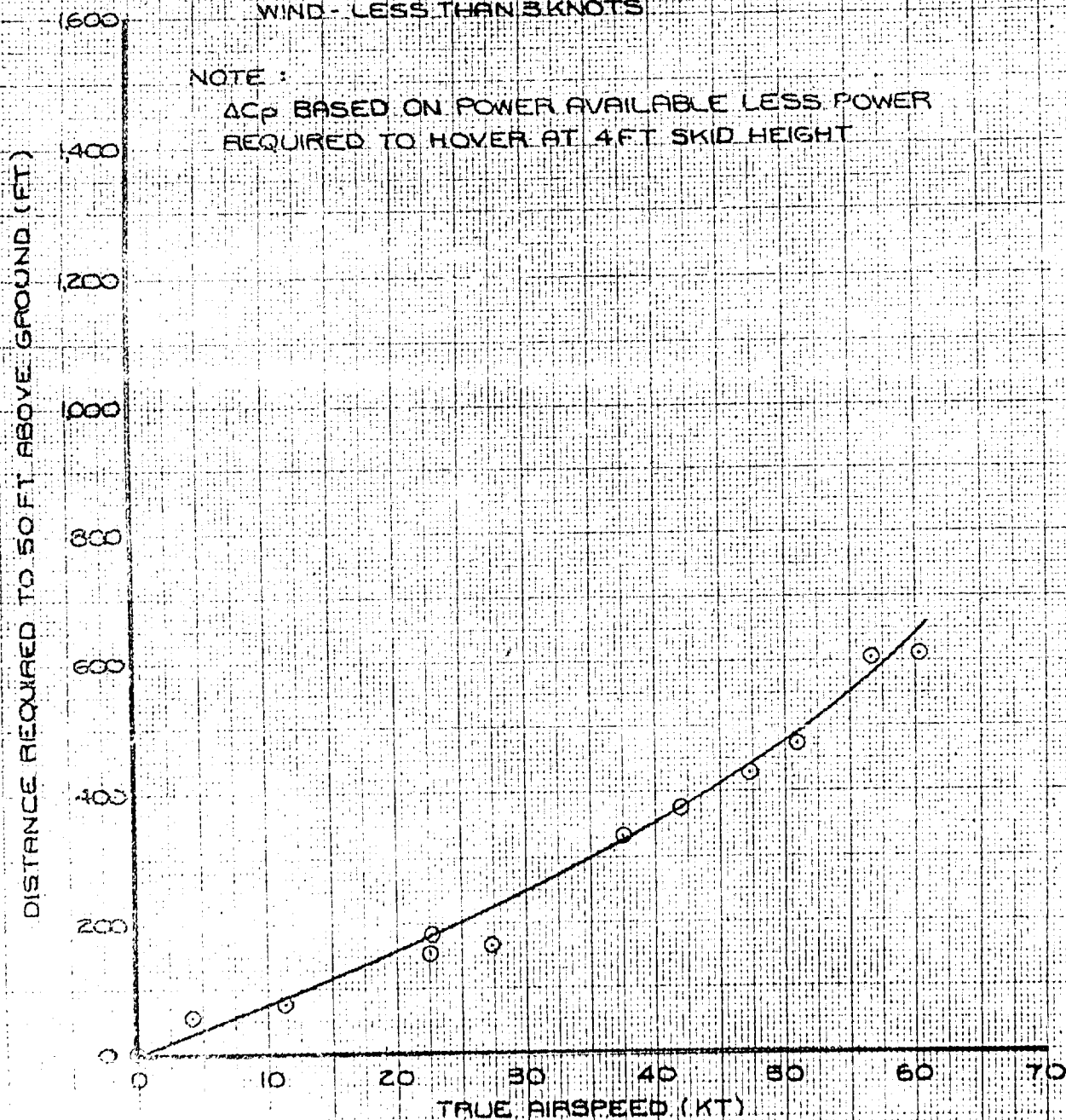
PRESSURE ALTITUDE (FT) = 9350

FREE AIR TEMPERATURE (°C) = 6.0

WIND - LESS THAN 3 KNOTS

NOTE:

ΔC_P BASED ON POWER AVAILABLE LESS POWER
REQUIRED TO HOVER AT 4 FT SKID HEIGHT



UH-1N USAF S/N 68-10776

T400-CP-400 ENGINE

CATEGORY II

TECHNIQUE

CLIMB AND ACCELERATION FROM LIGHT ON SKIDS -
WITH ROTOR SPEED BLEED

NOTE :

1. CURVES DERIVED FROM FIGURES 31 THROUGH 33
2. DO NOT EXTRAPOLATE THESE DATA
3. AC_P BASED ON POWER AVAILABLE LESS POWER
REQUIRED TO HOVER AT 4 FT SKID HEIGHT

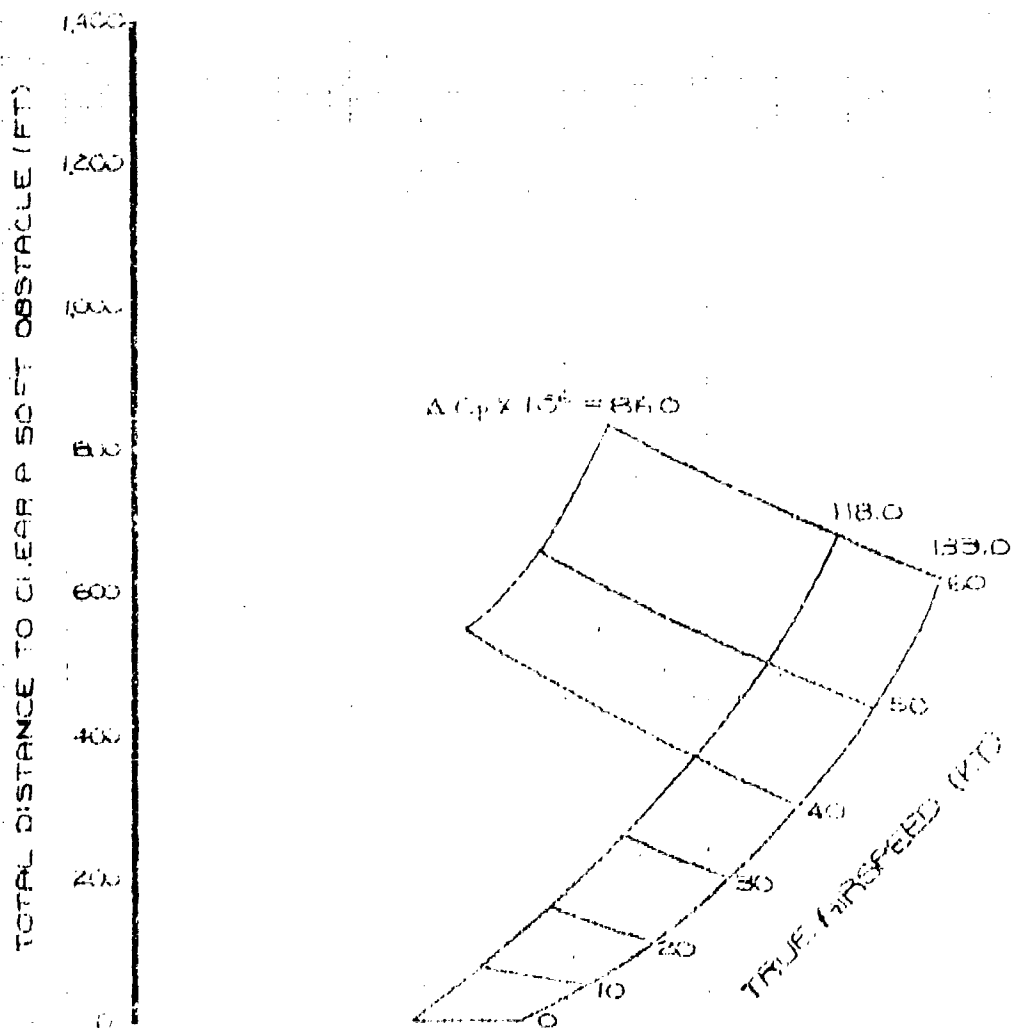


FIGURE 33 NONDIMENSIONAL TAKEOFF PERFORMANCE

UH-1N LRF S/N 88-10776
T400-CP-430 ENGINE
CATEGORY II

TECHNIQUE: CLIMB AND ACCELERATION FROM LIGHT ON SKIDS -
WITH ROTOR SPEED BLEED

$$AC_P = 18.6 \times 10^{-6}$$

$$\text{ROTOR SPEED (RPM)} = 324 - 3.1A$$

$$\text{GROSS WEIGHT (LB)} = 10888$$

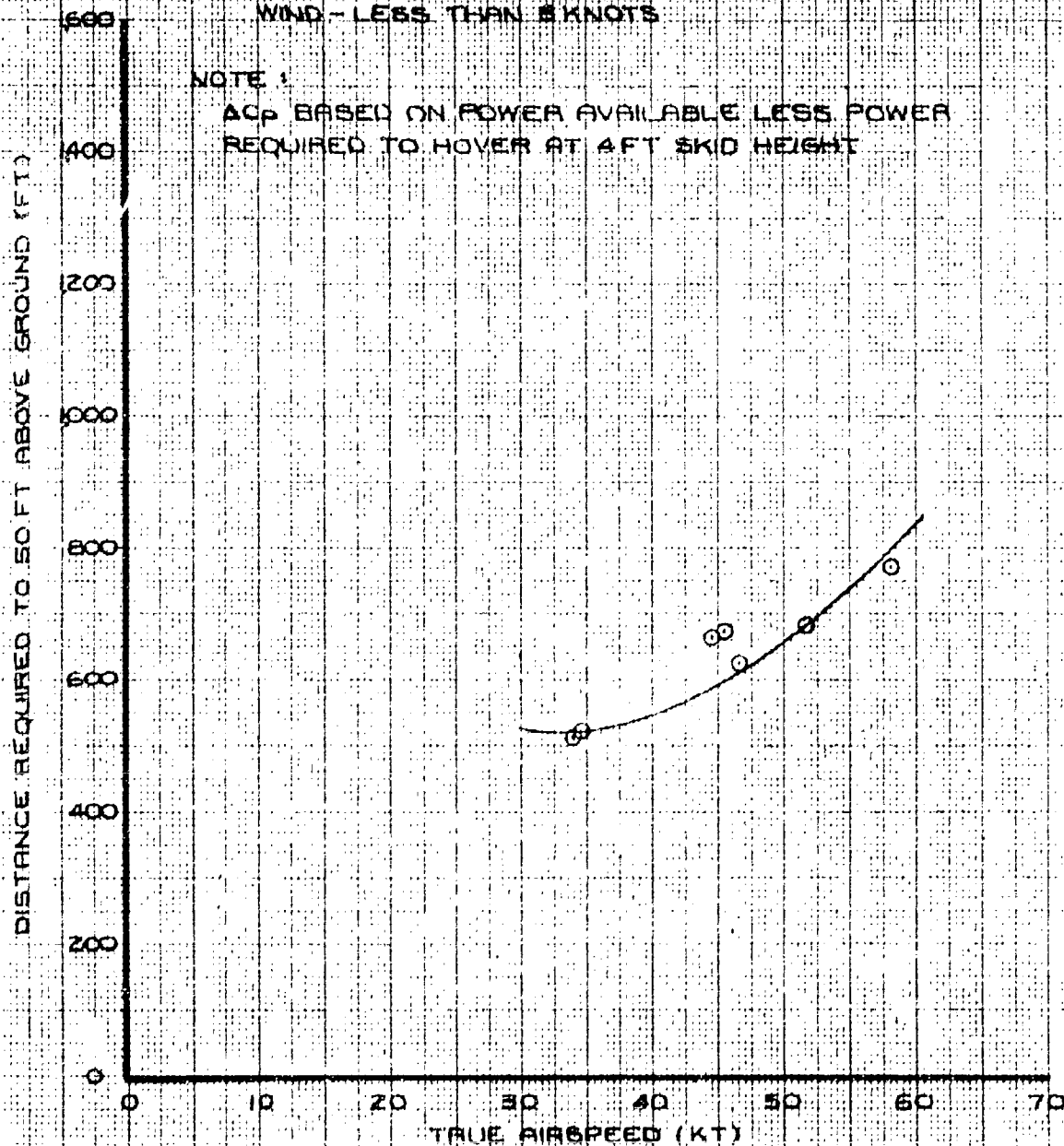
$$\text{PRESSURE ALTITUDE (FT)} = 9340$$

$$\text{FREE AIR TEMPERATURE (°C)} = 9.0$$

WIND - LESS THAN 8 KNOTS

NOTE:

AC_P BASED ON POWER AVAILABLE LESS POWER
REQUIRED TO HOVER AT AFT SKID HEIGHT



UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

TECHNIQUE: CLIMB AND ACCELERATION FROM LIGHT ON SKIDS -
WITH ROTOR SPEED BLEED

$\Delta C_p = 118 \times 10^{-6}$

ROTOR SPEED (RPM) = 324-314

GROSS WEIGHT (LB) = 9,950

PRESSURE ALTITUDE (FT) = 9,560

FREE AIR TEMPERATURE ($^{\circ}\text{C}$) = 1.0

WIND - LESS THAN 3 KNOTS

NOTE:

ΔC_p BASED ON POWER AVAILABLE LESS POWER
REQUIRED TO HOVER AT 4 FT. SKID HEIGHT

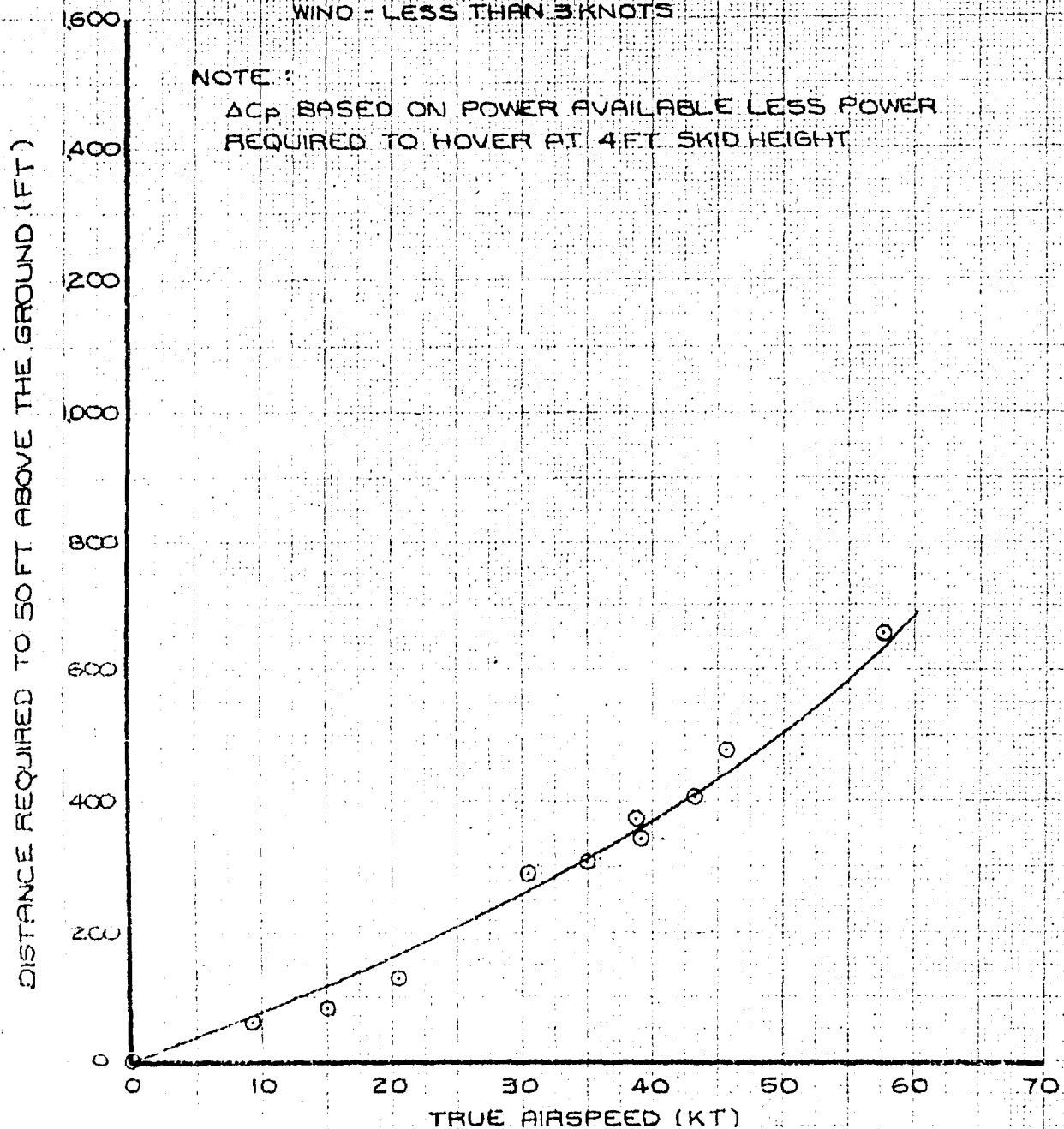


FIGURE 32 TAKEOFF DISTANCE REQUIRED TO CLEAR A 50-FT OBSTACLE 47

UH-1H HOIST WINCH 50-0776

T400-CP-400 ENGINE

CATEGORY II

TECHNIQUE: CLIMB AND ACCELERATION FROM LIGHT ON SKIDS -
WITH ROTOR SPEED BLEED

AC_{p} = 326 KNOTS

ROTOR SPEED (RPM) = 324 - 334

GROSS WEIGHT (LB) = 9390

PRESSURE ALTITUDE (FT) = 9480

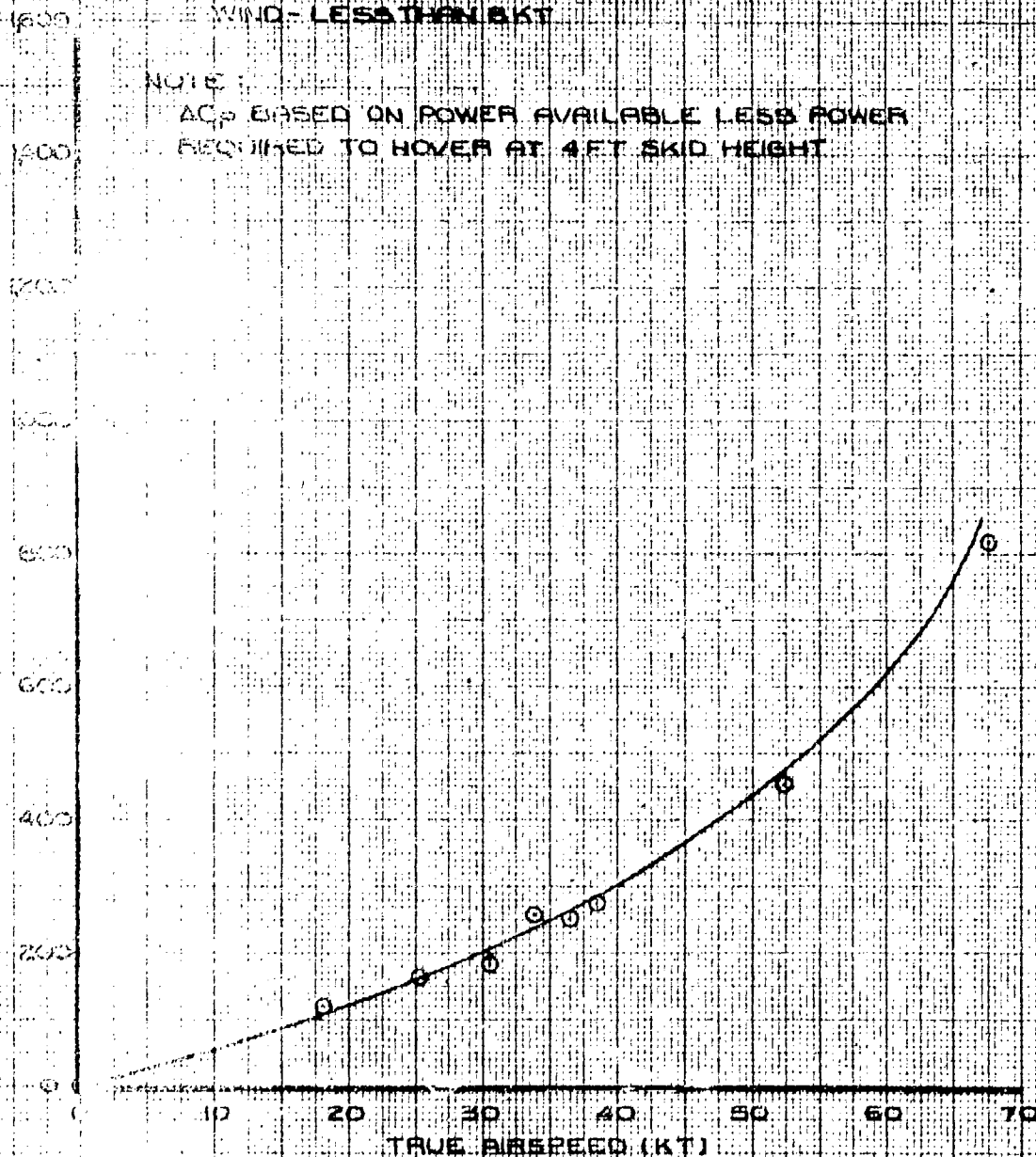
FREE AIR TEMPERATURE (°C) = 12.0

WIND - LESS THAN 8 KTS

NOTE:

AC_{p} BASED ON POWER AVAILABLE LESS POWER
REQUIRED TO HOVER AT 4 FT SKID HEIGHT

DISTANCE REQUIRED TO 50 FT ABOVE GROUND (FT)



WHIN WOLF S/N 28-10776

T400-CP-400 ENGINE

CATEGORY II

TECHNIQUE

LEVEL ACCELERATION FROM A 15-FT HOVER -
WITHOUT ROTOR SPEED BLEED

NOTE:

1. CURVES DERIVED FROM FIGURES 35 THROUGH 37.
2. DO NOT EXTRAPOLATE THESE DATA.

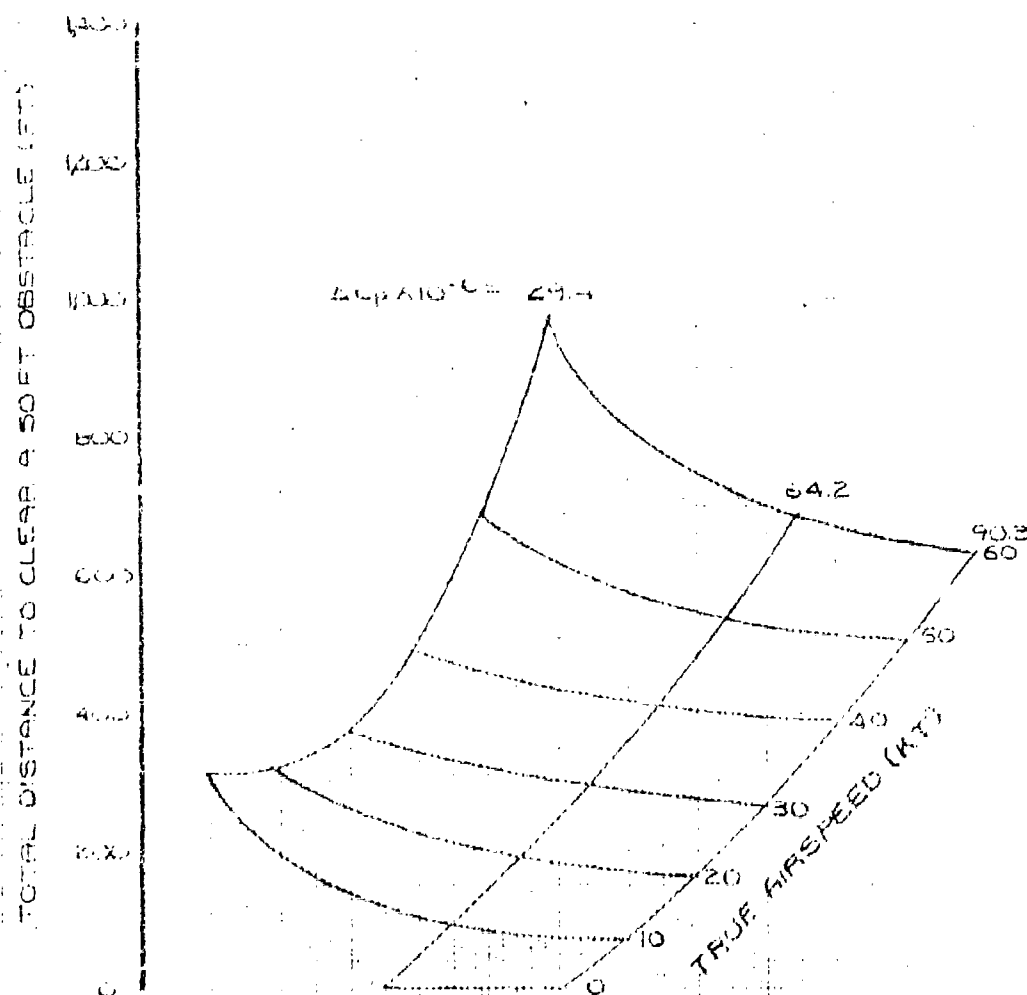


FIGURE 34 NONDIMENSIONAL TAKEOFF PERFORMANCE

UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

TECHNIQUE: LEVEL ACCELERATION FROM A 15-FT HOVER -
WITHOUT ROTOR SPEED BLEED

$\Delta C_p = 29.4 \times 10^{-6}$

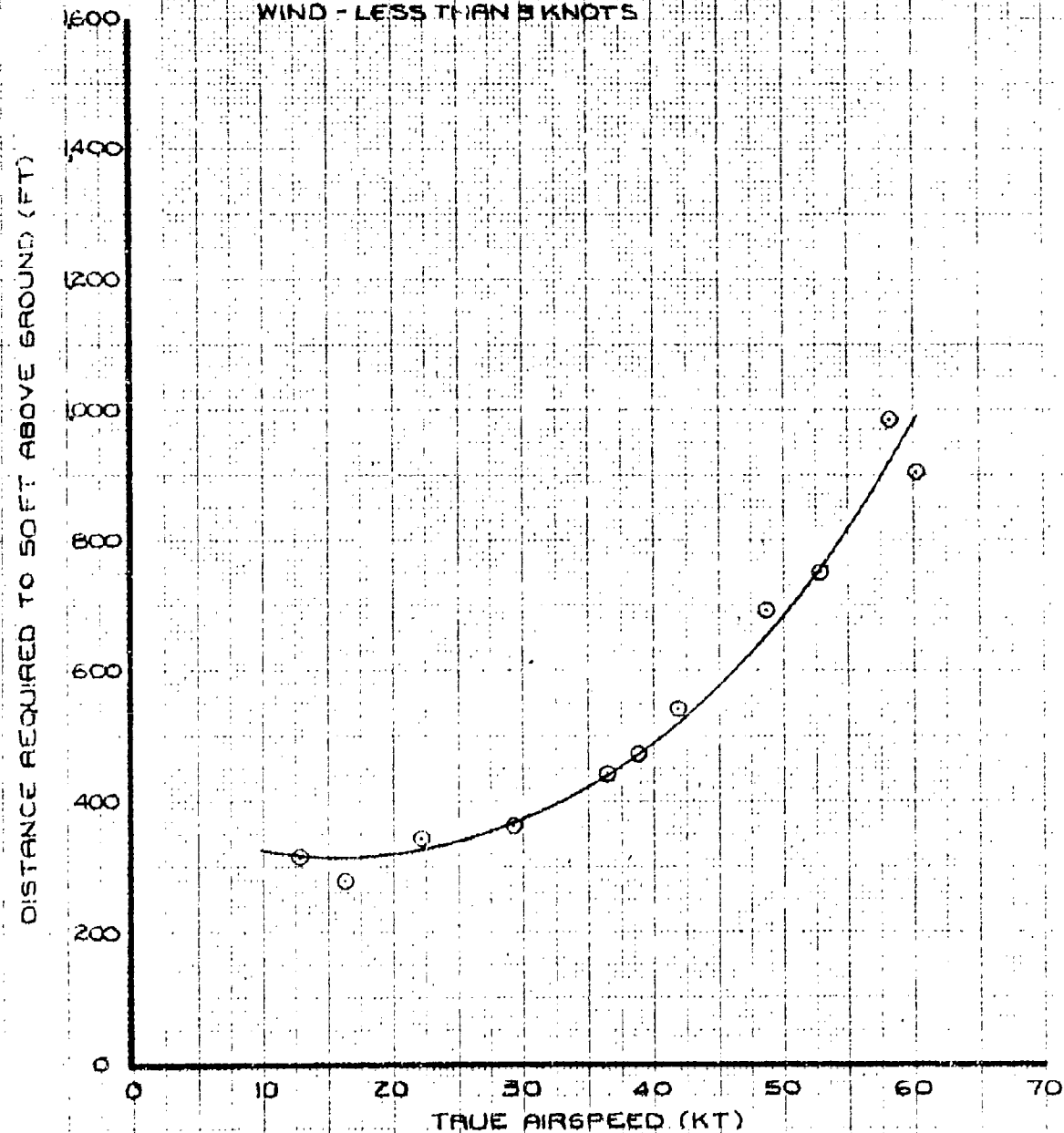
ROTOR SPEED (RPM) = 324

GROSS WEIGHT (LB) = 9,840

PRESSURE ALTITUDE (FT) = 9,480

FREE AIR TEMPERATURE ($^{\circ}\text{C}$) = 5.0

WIND - LESS THAN 3 KNOTS



50 FIGURE 35 TAKEOFF DISTANCE REQUIRED TO CLEAR A 50-FT OBSTACLE

UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

TECHNIQUE: LEVEL ACCELERATION FROM A 15-FT HOVER --
WITHOUT ROTOR SPEED BLEED

$\Delta C_p = 64.2 \times 10^{-6}$

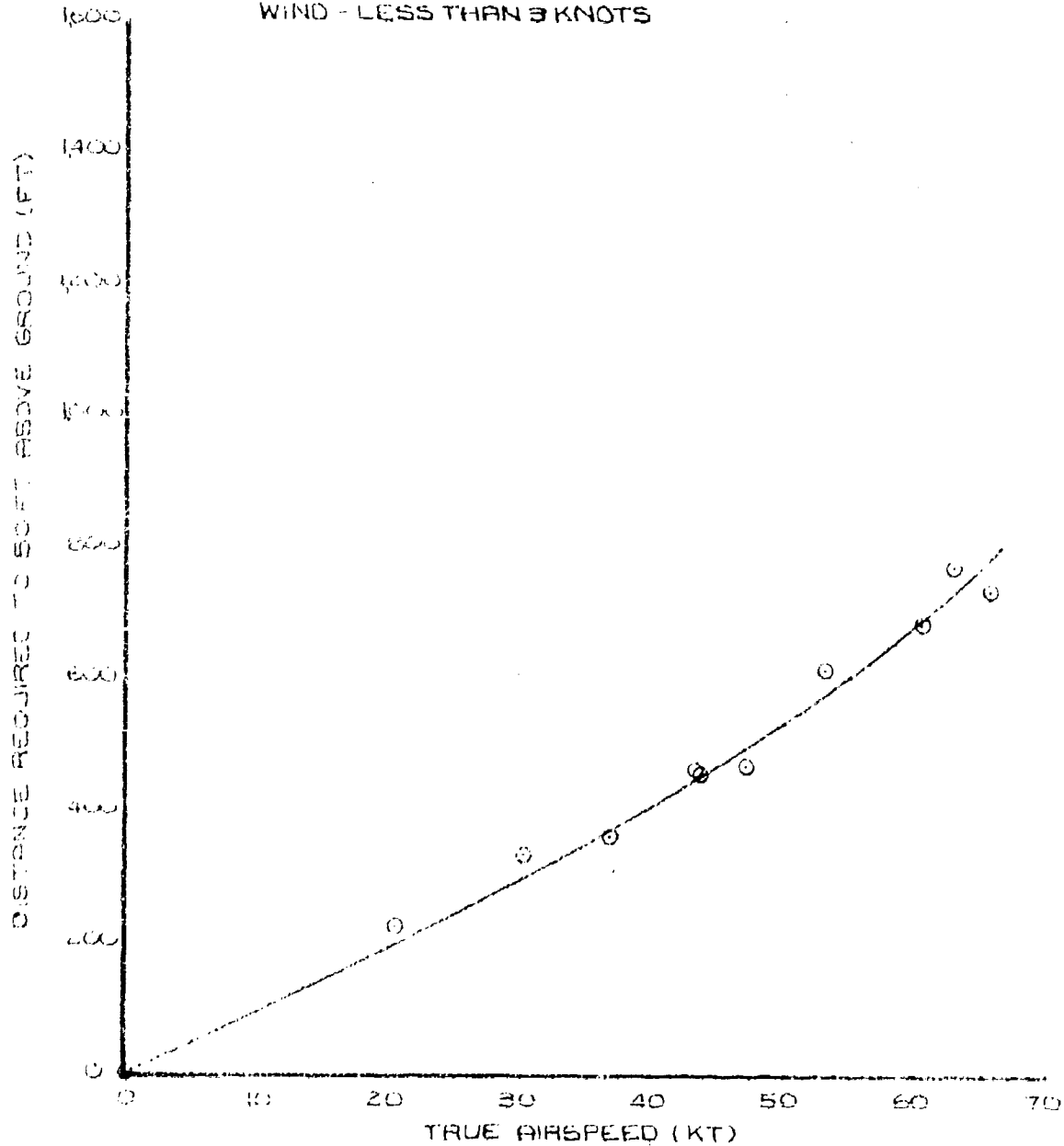
ROTOR SPEED (RPM) = 324

GROSS WEIGHT (LB) = 9,370

PRESSURE ALTITUDE (FT) = 9,490

FREE AIR TEMPERATURE (deg C) = 3.0

WIND - LESS THAN 3 KNOTS



UH-1N USAF S/N 68-10776

T400-CP-400 ENGINE

CATEGORY II

TECHNIQUE : LEVEL ACCELERATION FROM 15-FT HOVER-
WITHOUT ROTOR SPEED BLEED

$\Delta C_p = 90.3 \times 10^{-6}$

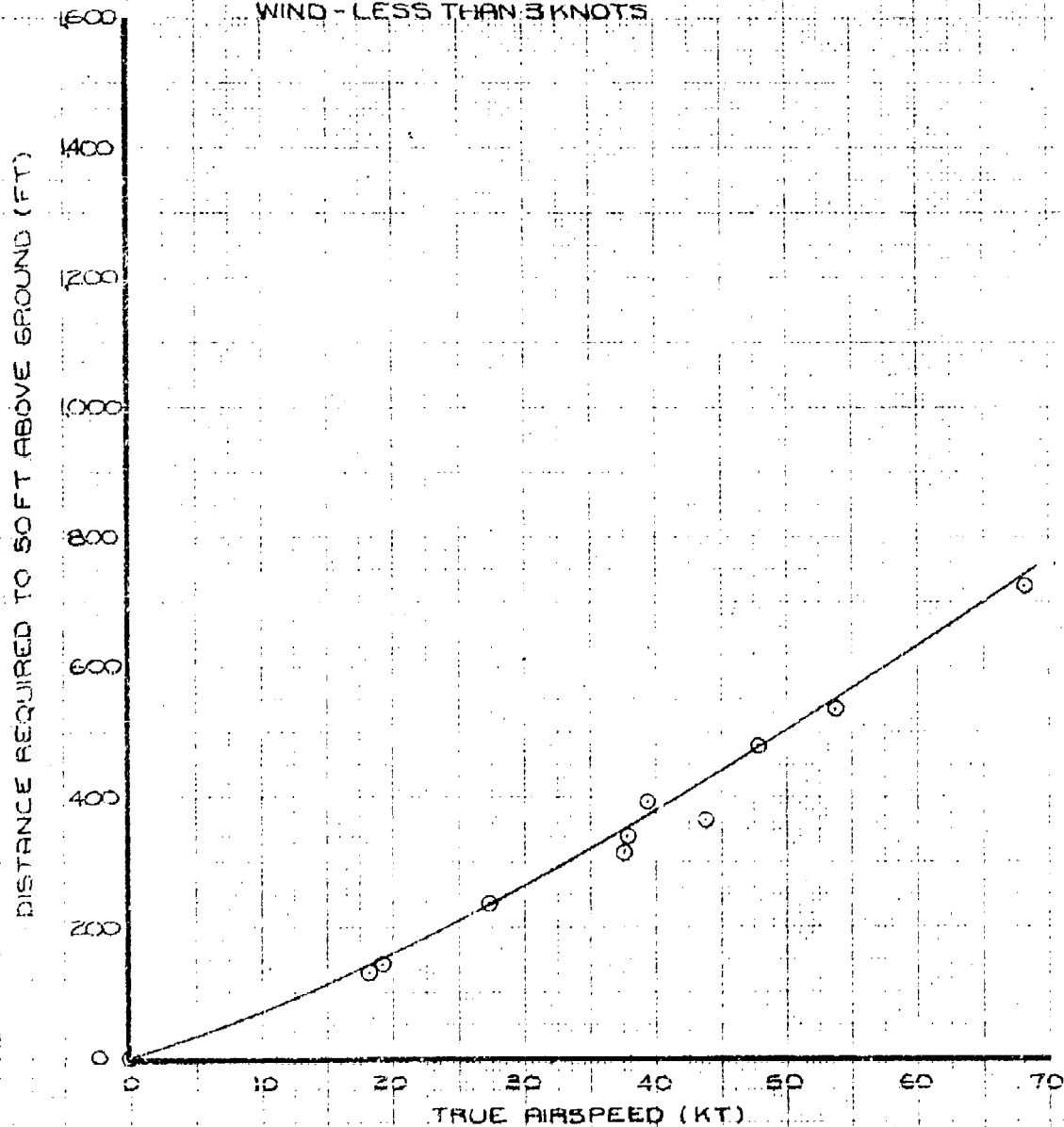
ROTOR SPEED (RPM) = 324

GROSS WEIGHT (LB) = 8,960

PRESSURE ALTITUDE (FT) = 9,610

FREE AIR TEMPERATURE (deg C) = 2.0

WIND - LESS THAN 3 KNOTS



UH-1H USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

| SYM | GROSS WT.(LB) | PRESS. ALT.(FT) | DAT (°C) | ROTOR SPEED (RPM) | SHR | TORQUE (FT-LB) |
|-----|------------------|--------------------|-------------|-------------------------|-------|-------------------|
| Q | 8,610 | 5,000 | -9.0 | 314 | 881 | 71 |
| O | 8,610 | 5,000 | -4.0 | 314 | 1,108 | 88 |
| Δ | 8,650 | 10,000 | -3.0 | 314 | 1,100 | 88 |
| □ | 8,440 | 14,000 | -10.0 | 314 | 1,104 | 88 |
| □ | 8,550 | 14,000 | -7.0 | 314 | 1,084 | 88 |

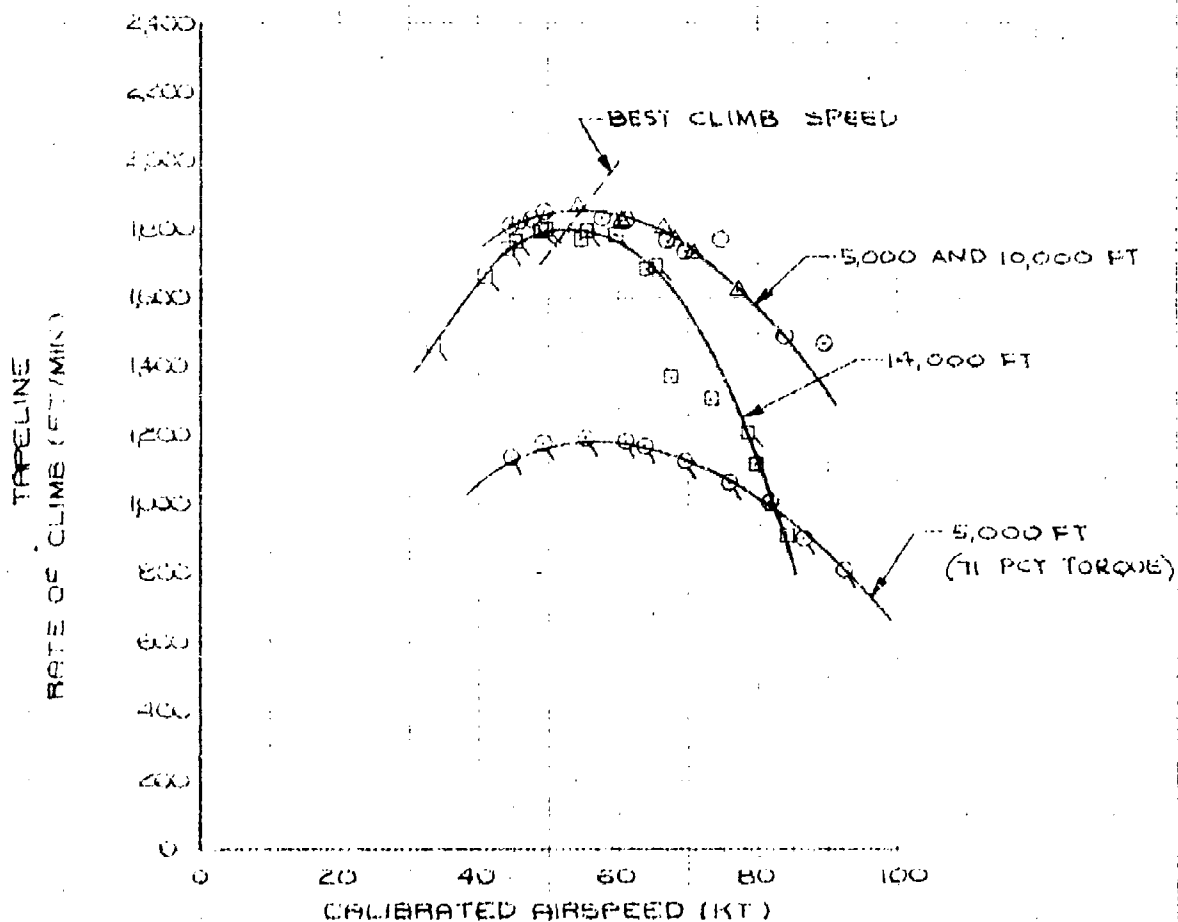


FIGURE 38 SAWTOOTH CLIMB PERFORMANCE

UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

| SYM | GROSS WT. (LB) | PRESS. ALT. (FT) | OAT (°C) | ROTOR SPEED (RPM) | SHP | TORQUE (PCT) |
|-----|-------------------|---------------------|-------------|-------------------------|------|-----------------|
| Q | 9970 | 5000 | 2.0 | 314 | 894 | 71 |
| O | 10080 | 5000 | 3.0 | 314 | 1103 | 88 |
| Δ | 10140 | 10000 | -13.0 | 314 | 1107 | 88 |

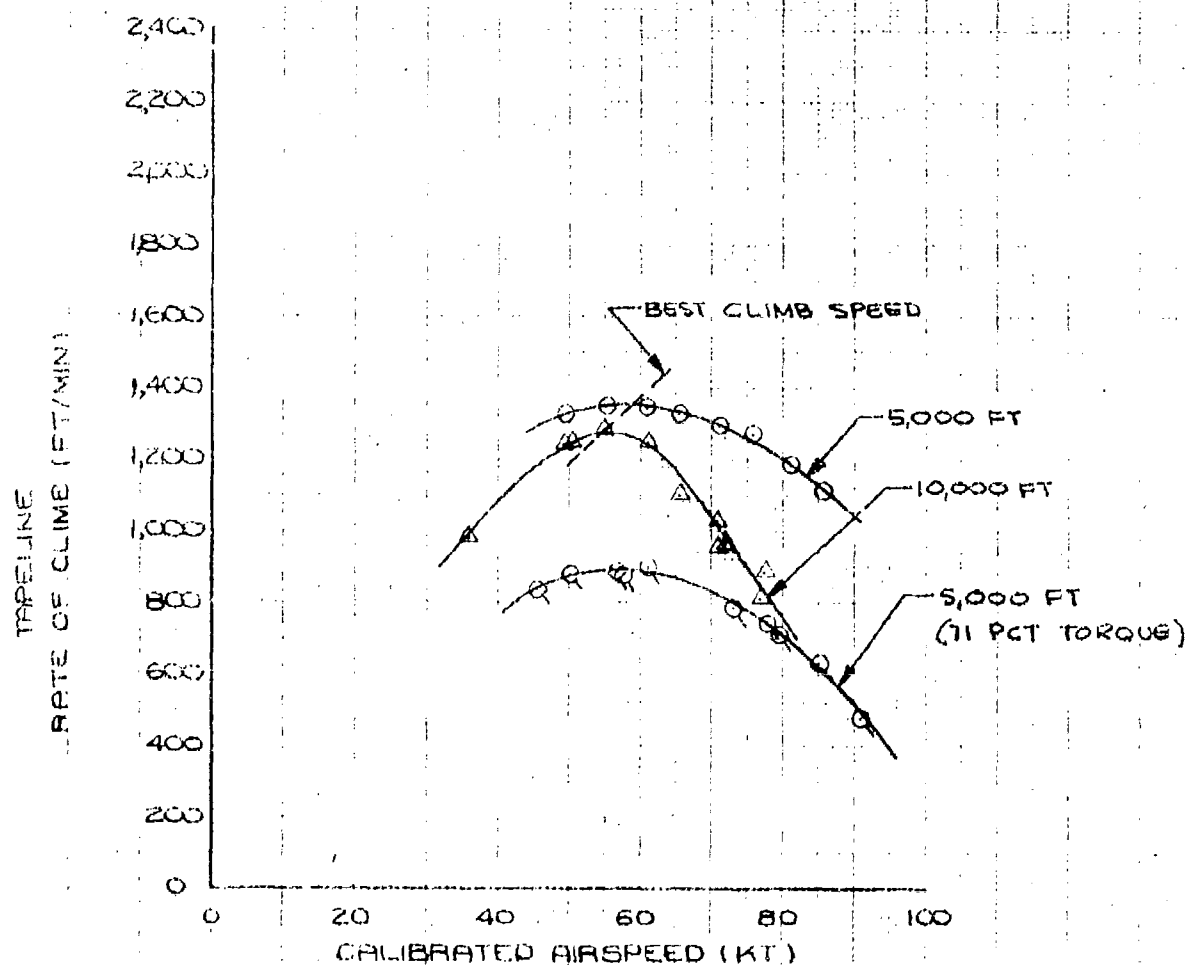


FIGURE 39 SAWTOOTH CLIMB PERFORMANCE

UH-1H USAF S/N 68-10776
 T400-CF-400 ENGINE
 CATEGORY II

TEST DAY CONDITIONS

ROTOR SPEED (RPM) = 314
 MAXIMUM CONTINUOUS POWER (88% TORQUE)
 C.G. LOCATION (AVG) = 137 IN. (MID)

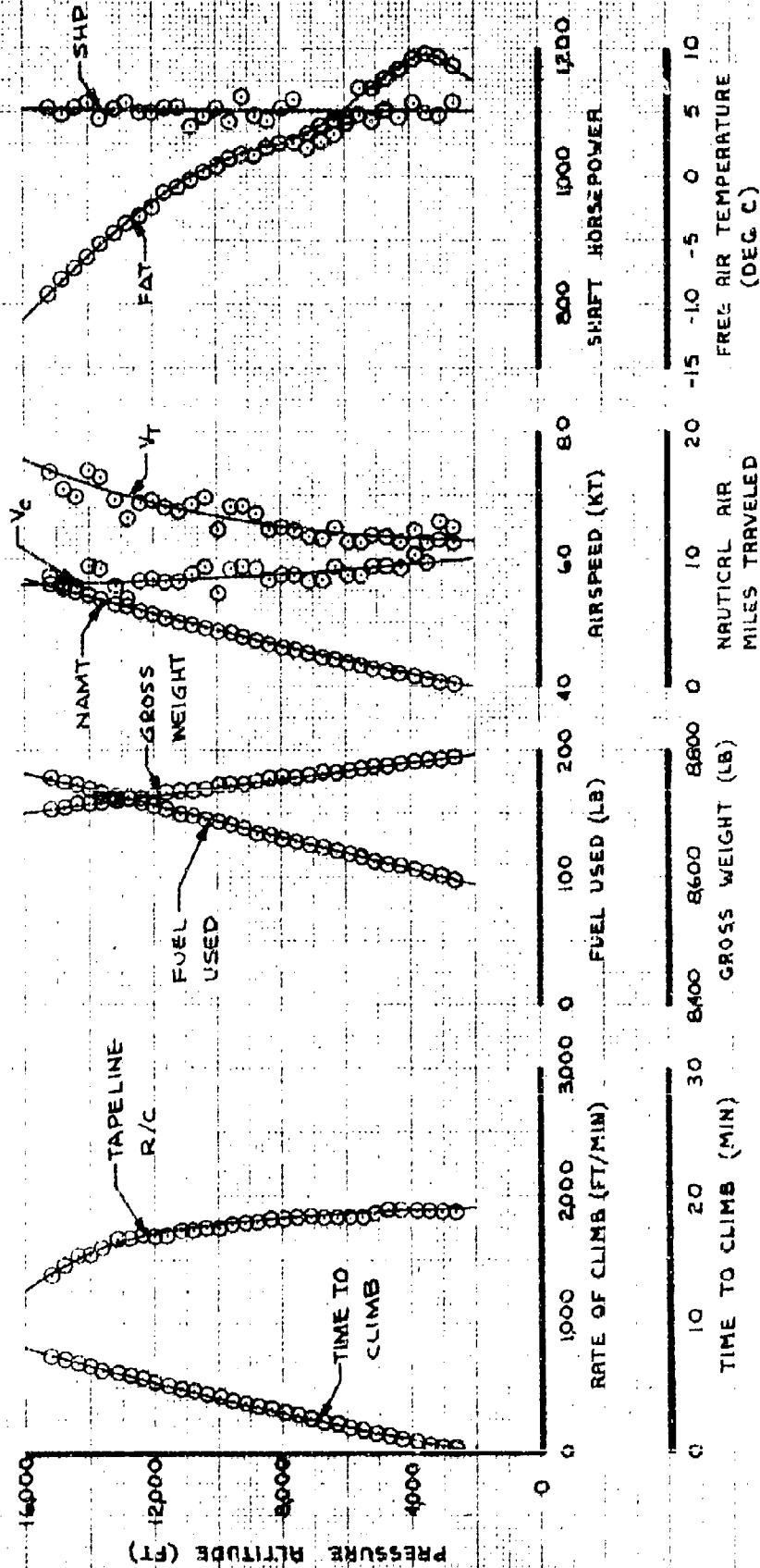


FIGURE 40 CONTINUOUS CLIMB PERFORMANCE

UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

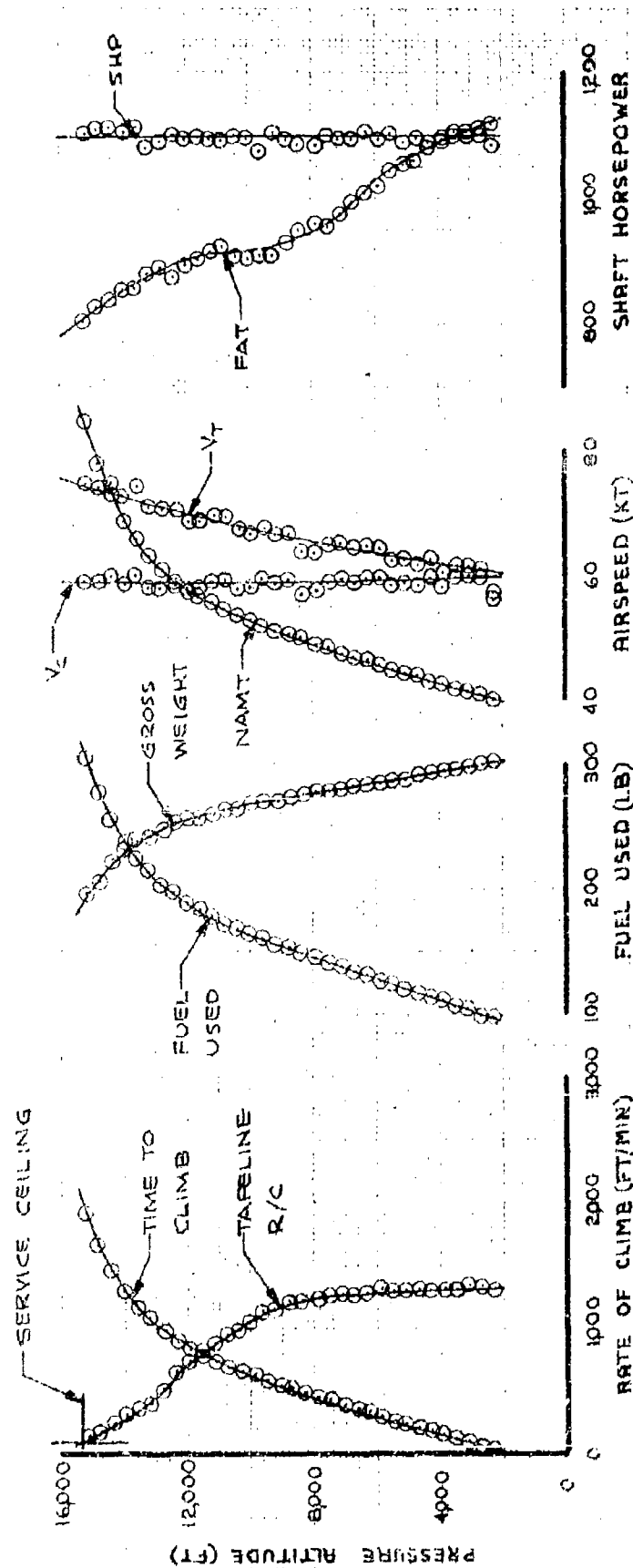
TEST DAY CONDITIONS

ROTOR SPEED (RPM) = 314

MAXIMUM CONTINUOUS POWER (93% TORQUE)

C.G. LOCATION (AVG) = 137 IN. (MID)

SERVICE CEILING



| CONTINUOUS CLIMB PERFORMANCE | | | NAUTICAL AIR MILES TRAVELED | | | FREE AIR TEMPERATURE (DEG C) | | |
|------------------------------|-------------------|----|-----------------------------|-------|-------|------------------------------|-----|-----|
| TIME TO CLIMB (MIN) | GROSS WEIGHT (LB) | | | | | | | |
| 0 | 10 | 20 | 30 | 10000 | 10200 | 10400 | 0 | 5 |
| | | | | | | | -20 | -15 |
| | | | | | | | -10 | -5 |
| | | | | | | | 0 | 5 |

FIGURE 41

UH-1N USAF S/N 68-10776
 T400-CP-400 Engines
 Category II

$\mu = 0.05$

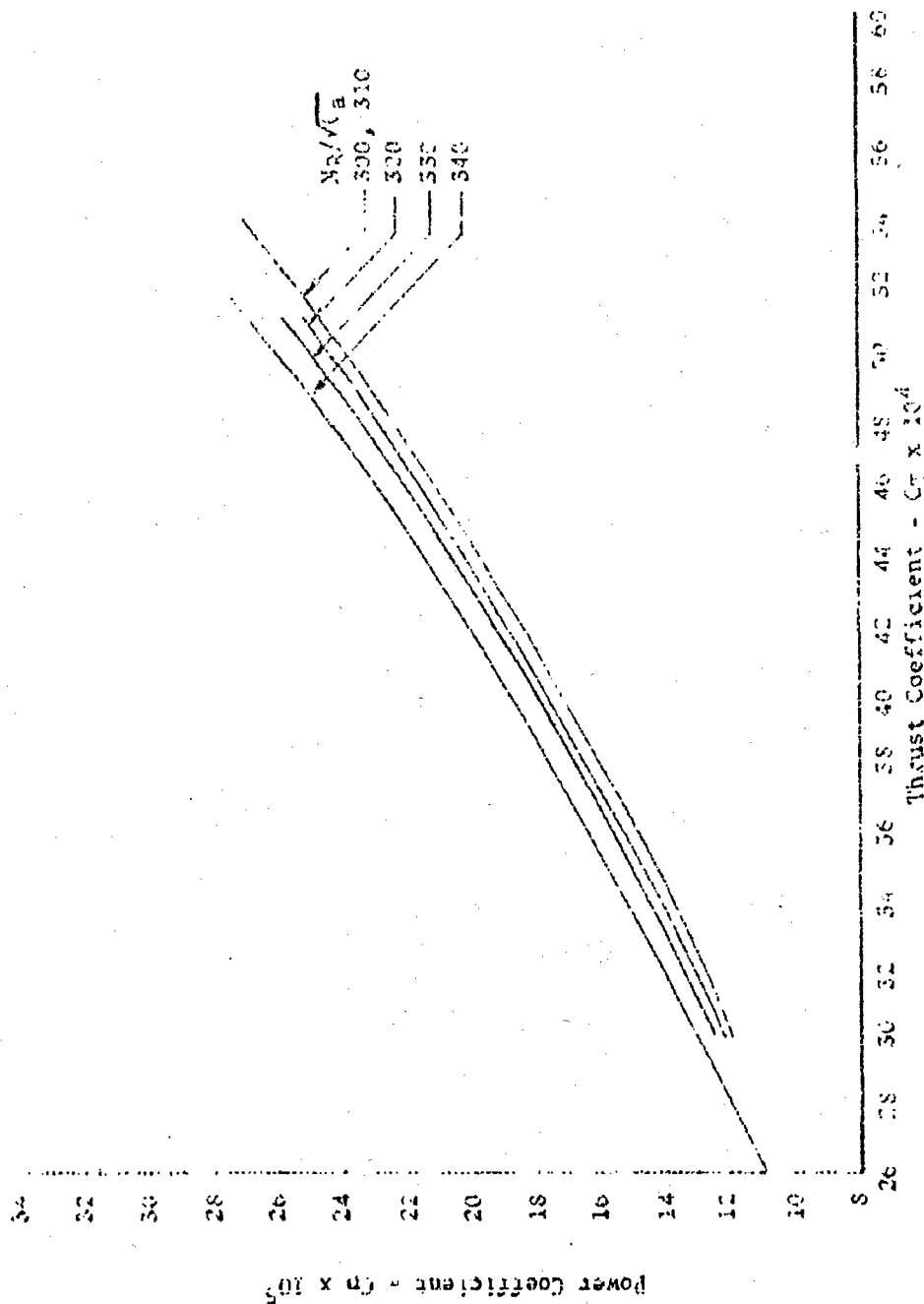


Figure 42 Nondimensional Level Flight Performance Summary

UH-1N USAF S/N 64-1077a
T400-CP-400 Engines

Latitude

$\phi = 0.10$

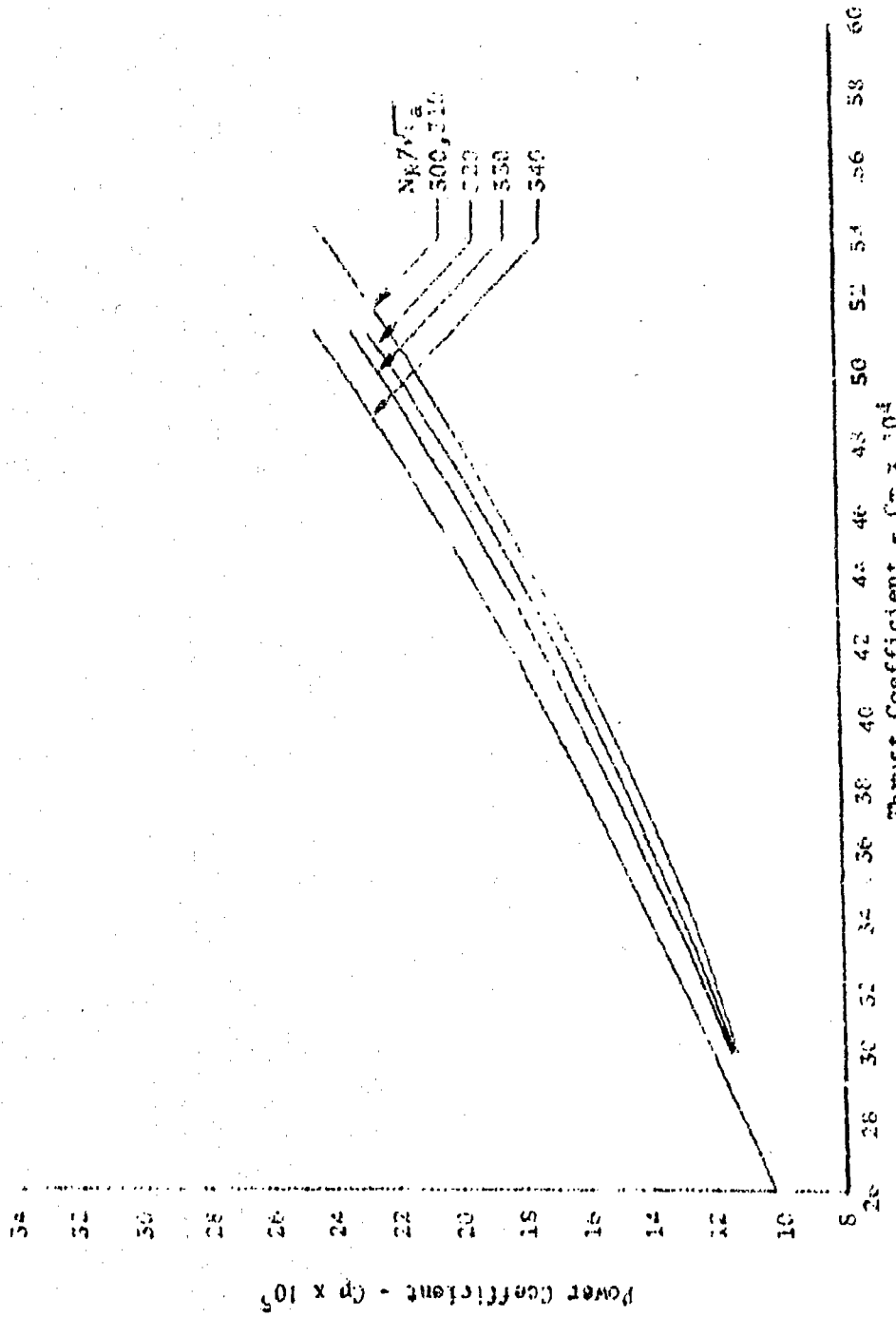


Figure 4B Nondimensional Level Flight Performance Summary

UH-1N USAF S/N 68-10776
 T403-CP-400 Engines
 Category II

$\mu = 0.12$

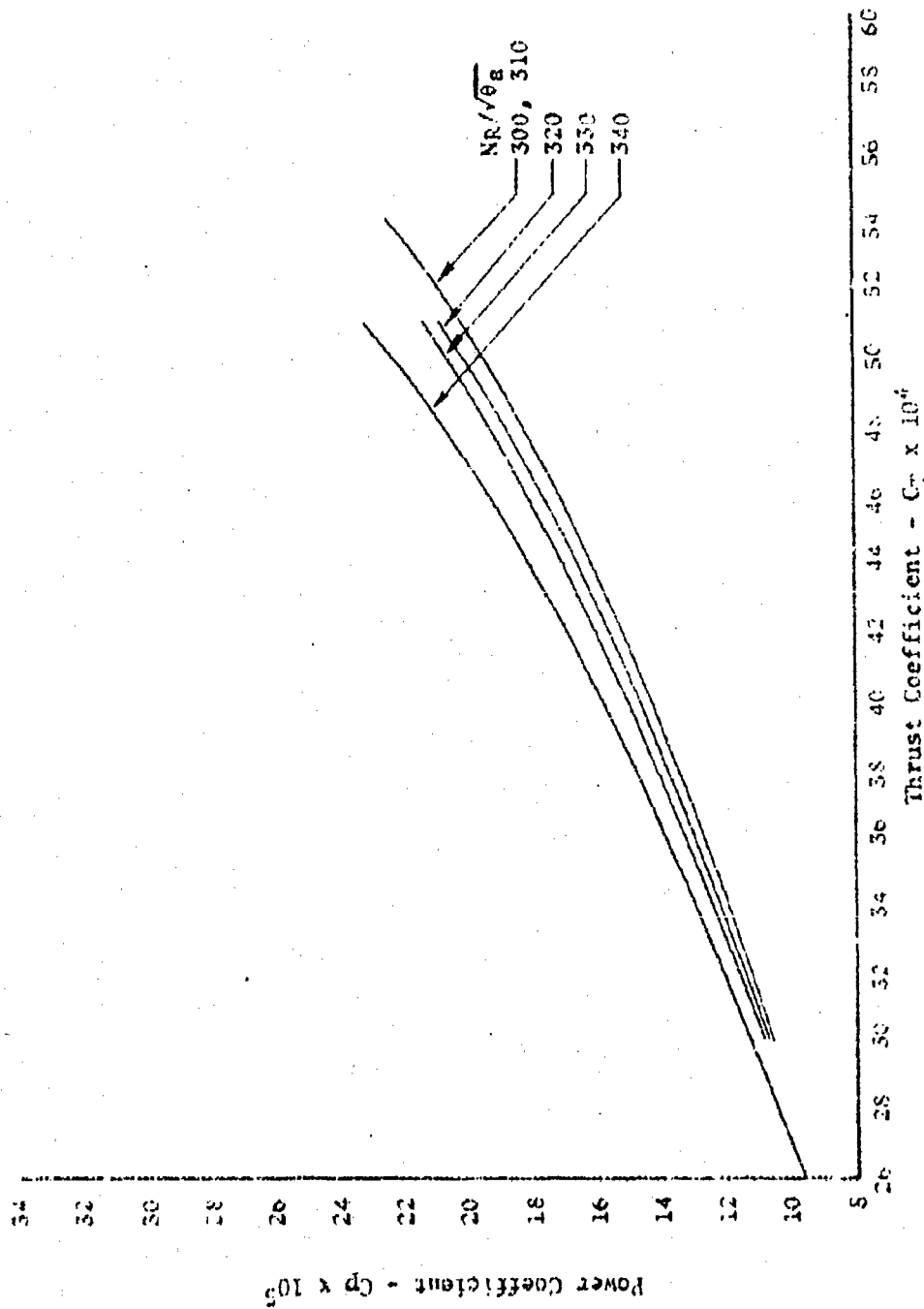


Figure 4-4 Nondimensional Level Flight Performance Summary

UP-IN USAF S/N 68-10776
 T400-CP-400 Engines
 Category II

$\mu = 0.14$

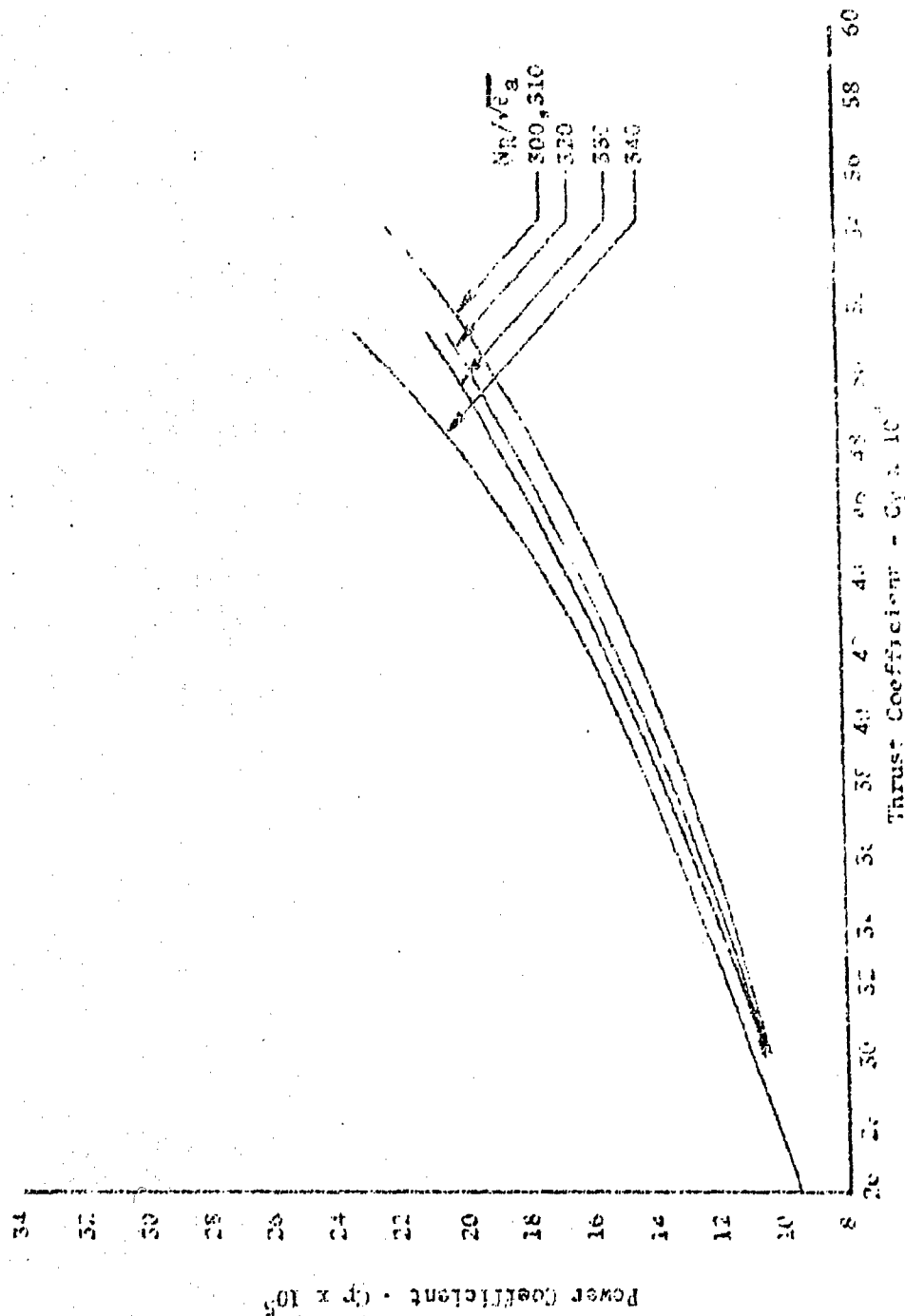


Figure 45 Nondimensional Level Flight Performance Summary

UH-1N USAF S/N 68-10776

T400-CP-400 Engines

Category II

$\mu = 0.16$

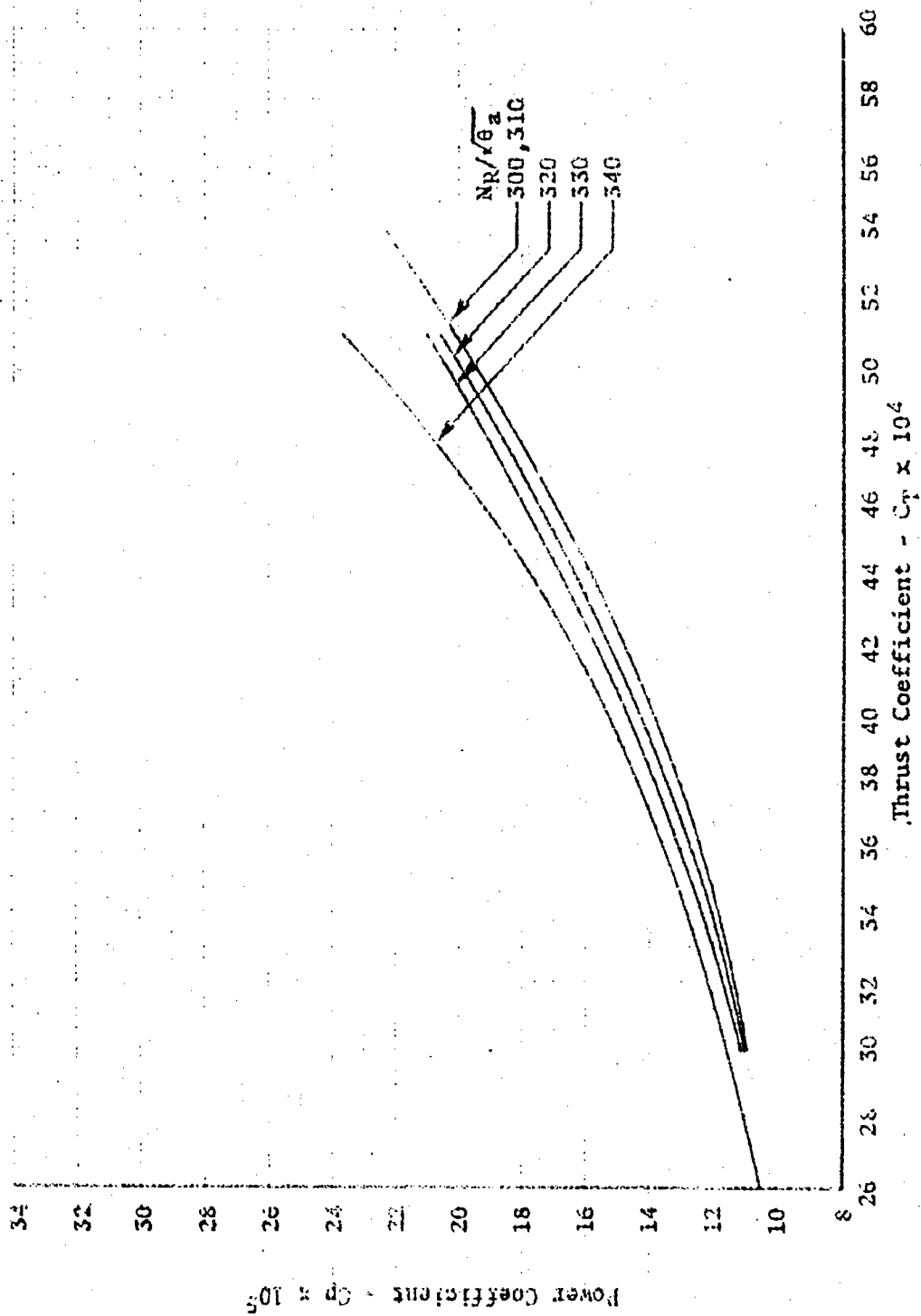


Figure 46 Nondimensional Level Flight Performance Summary

UH-1N USAF S/N 68-10776
 T400-CP-400 Engines
 Category II

$\mu = 0.18$

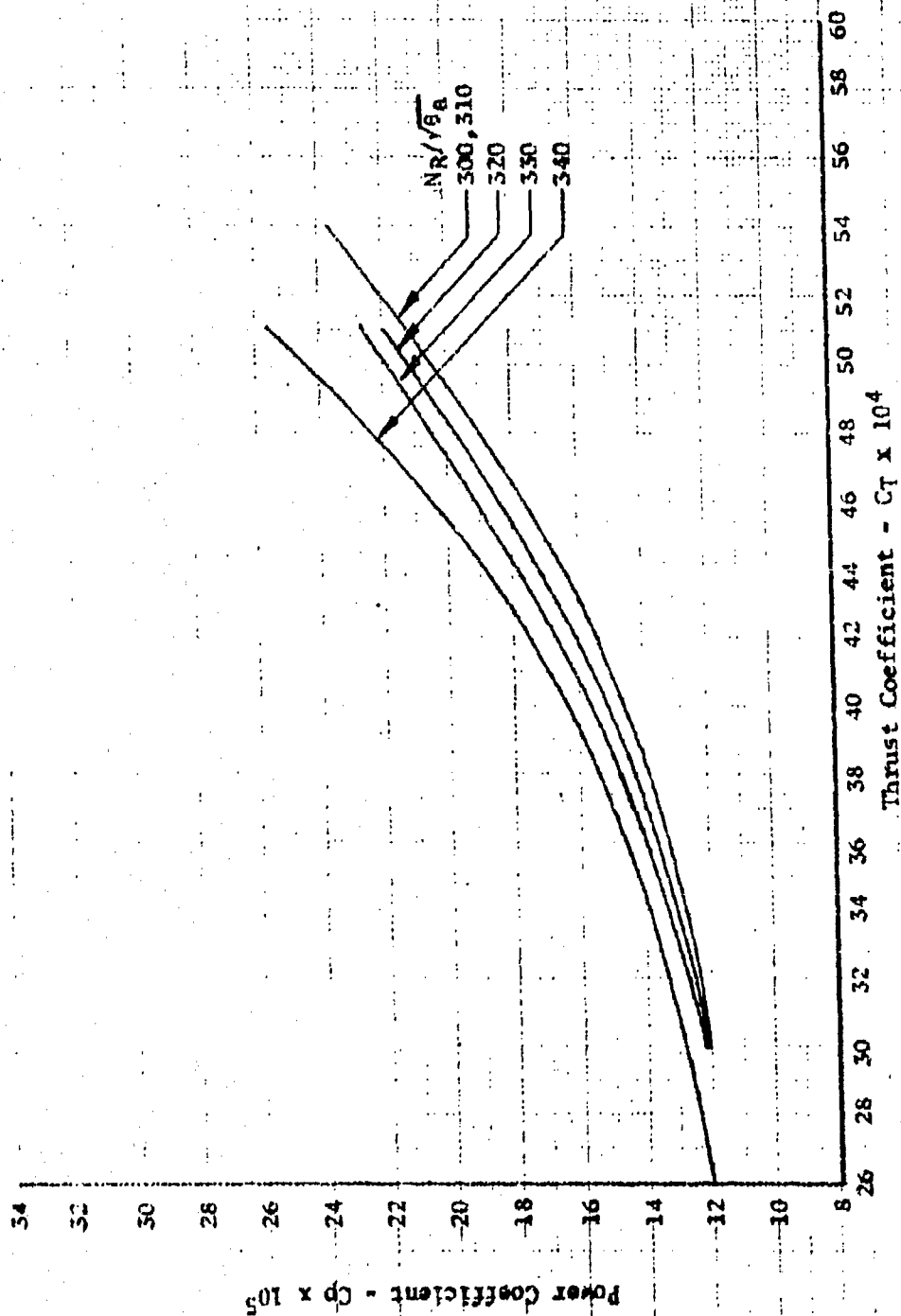


Figure 47 Nondimensional Level Flight Performance Summary

UH-1N USAF S/N 68-10776

T400-CP-400 Engines

Category II

$\mu = 0.20$

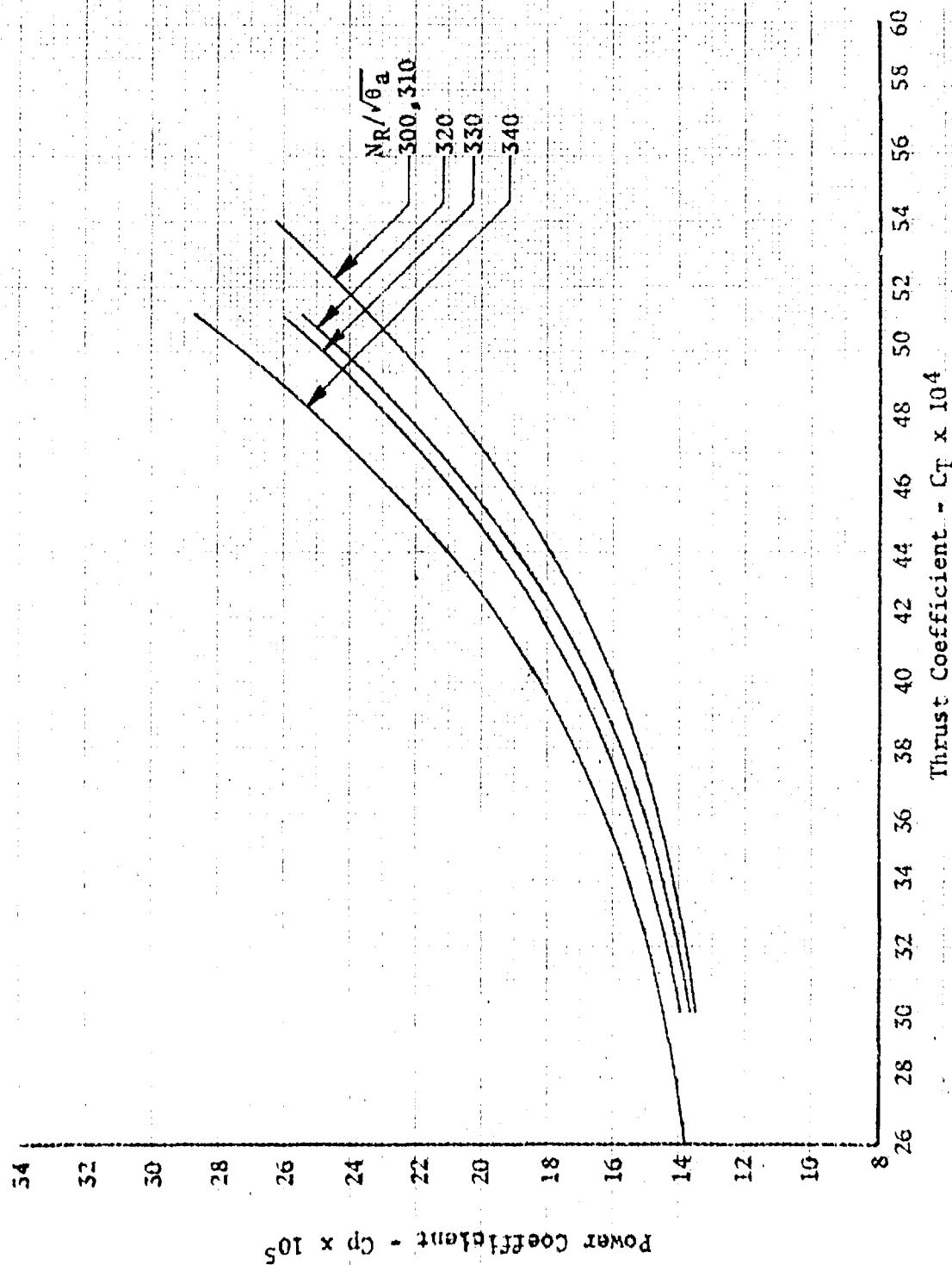


Figure 48 Nondimensional Level Flight Performance Summary

UH-1N USAF S/N 68-10776
 T400-CP-400 Engines
 Category II

$\mu = 0.22$

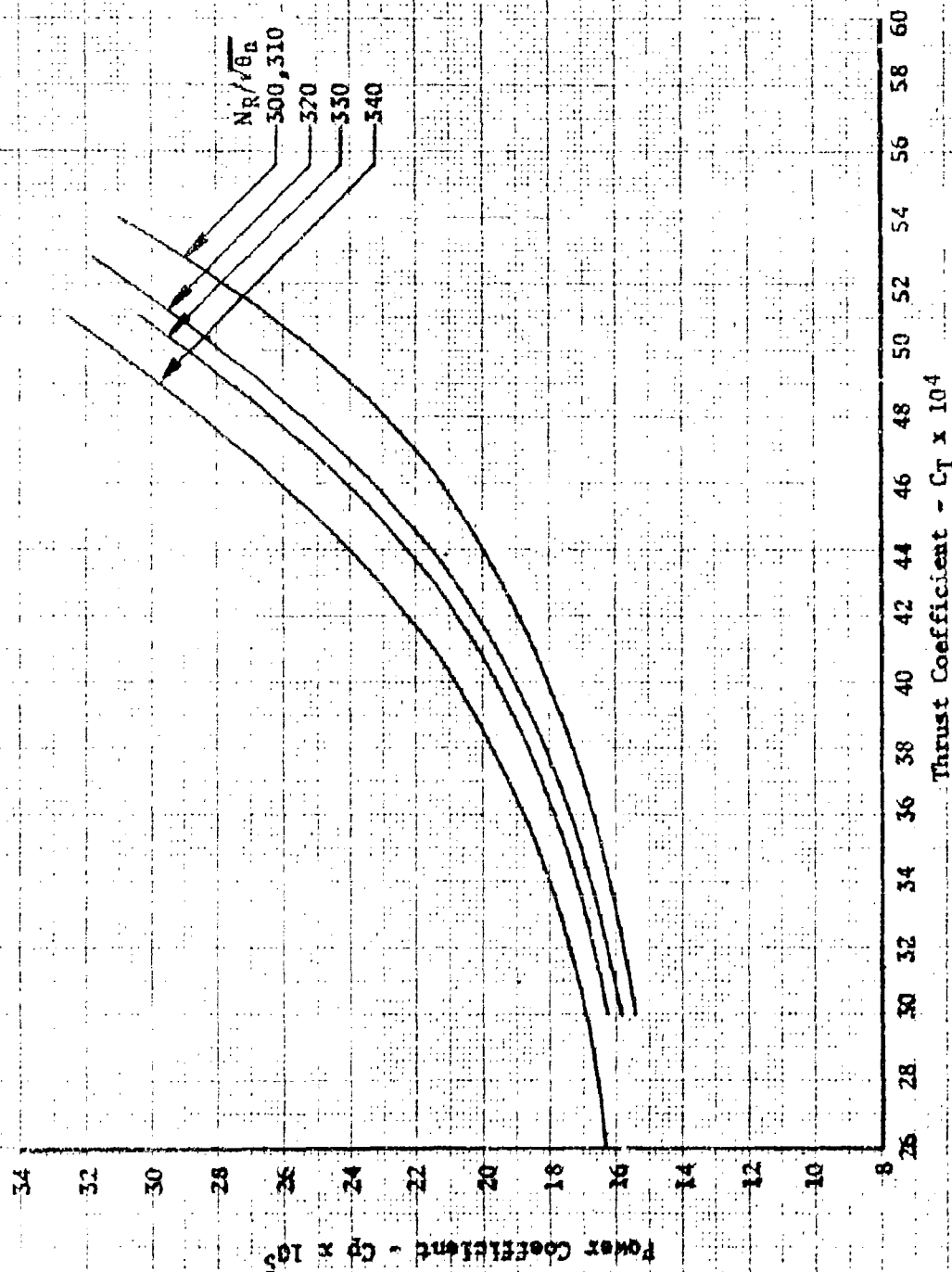


Figure 49 Nondimensional Level Flight Performance Summary

UH-1N USAF S/N 68-10776
 T400-CP-400 Engines
 Category I:

$\mu = 0.24$

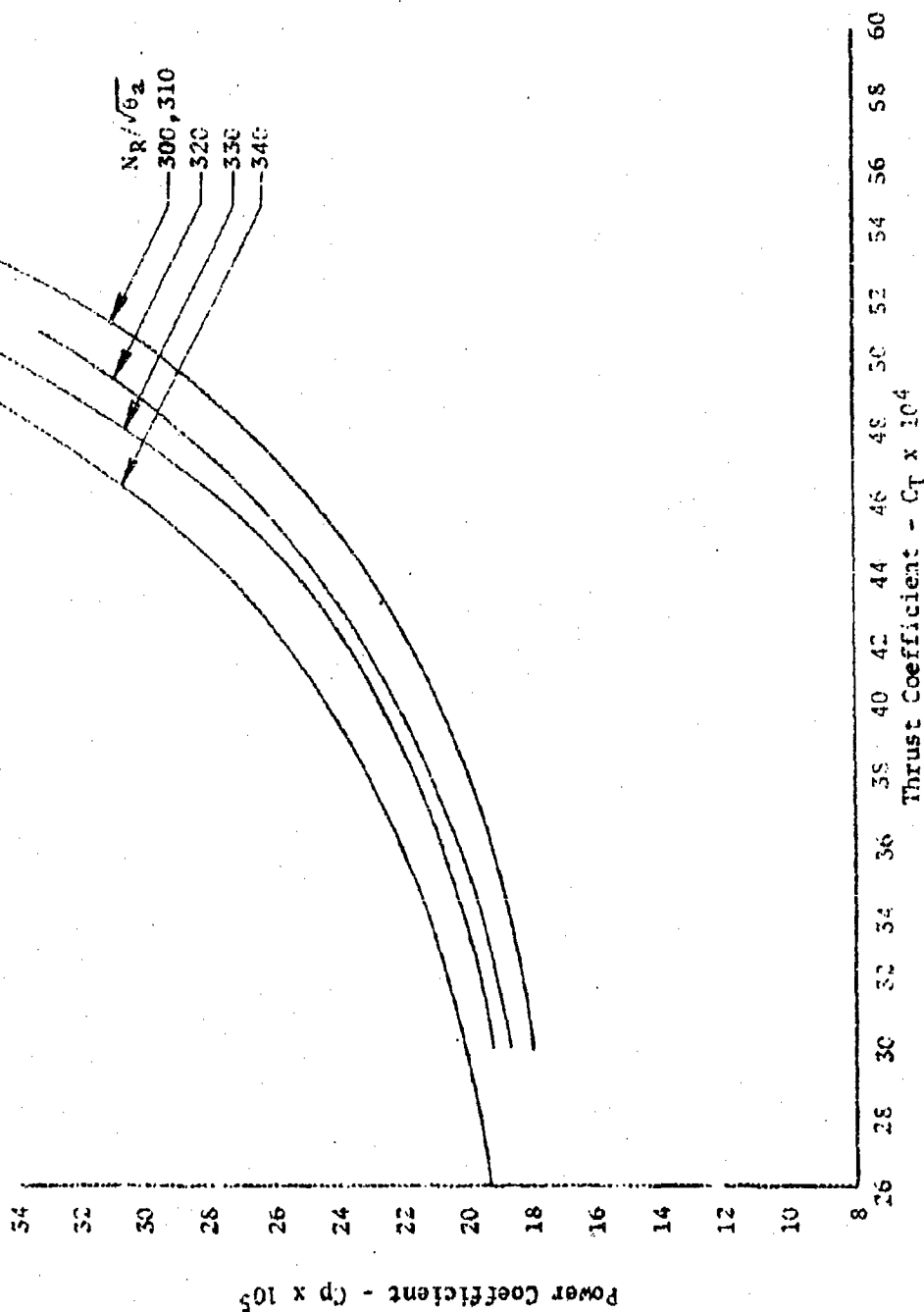


Figure 50 Nondimensional Level Flight Performance Summary

U1-1N USAF S/N 68-1076
T400-CP-400 Engines
Category II

$\mu = 0.26$

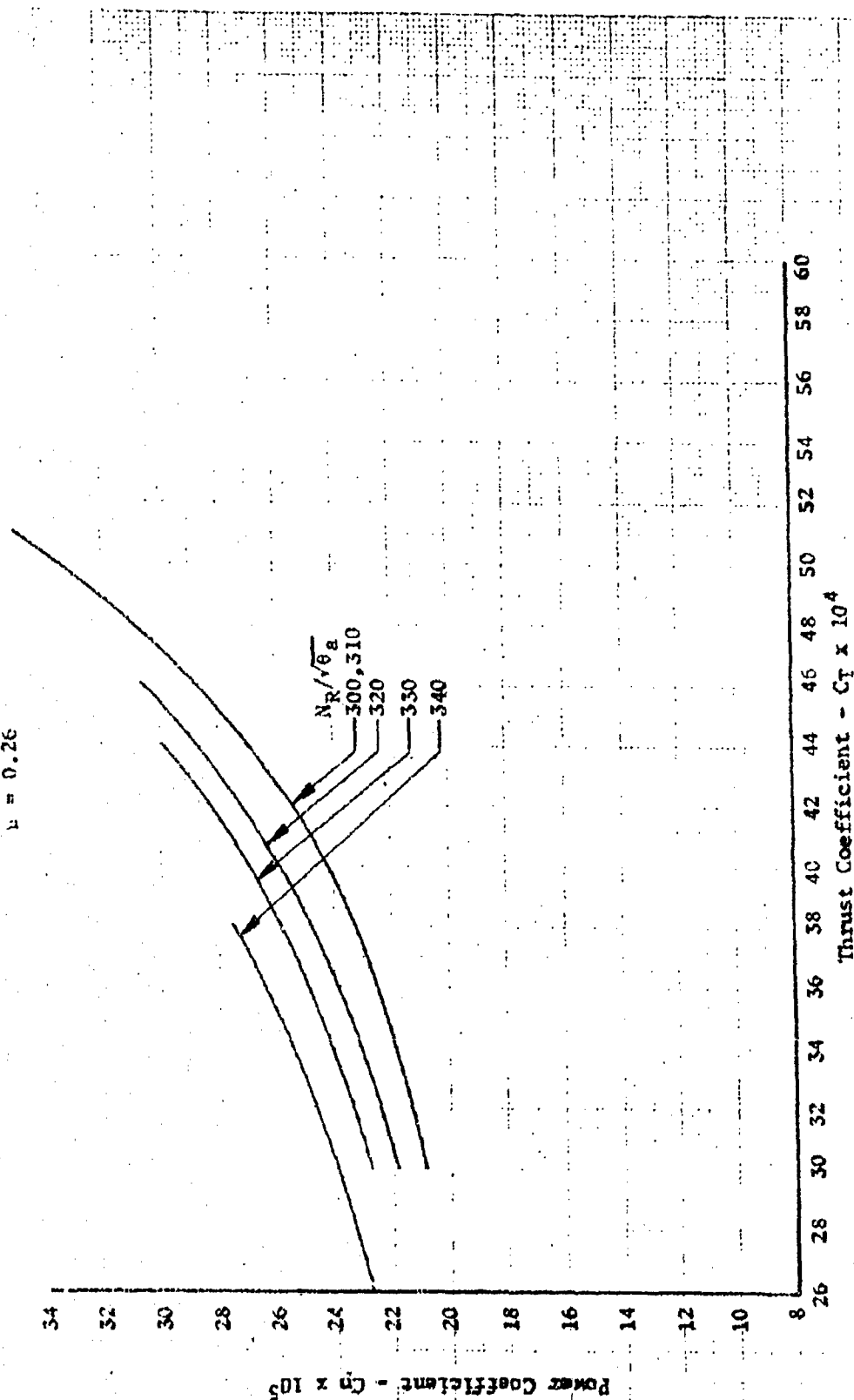


Figure 51 Nondimensional Level Flight Performance Summary

UH-1N USAF S/N 68-10776
T400-CP-400 Engine
Category II

Condition No. = 1

$C_1 = 0.0026$

$W/\delta_a = 6,780$

$N_R/\sqrt{C_d} = 339.5$

Avg N_R (rpm) = 315.2

Loading = CLEAN

Avg Pressure Altitude (Ft) = 3,250

Avg Free Air Temp. ($^{\circ}\text{C}$) = -24.8

Avg Gross Weight (lb) = 7,800

Avg cg Location (Sta) = 136.9

NOTE - TAILED SYMBOLS INDICATE BLEED

AIR ON FOR HEAT

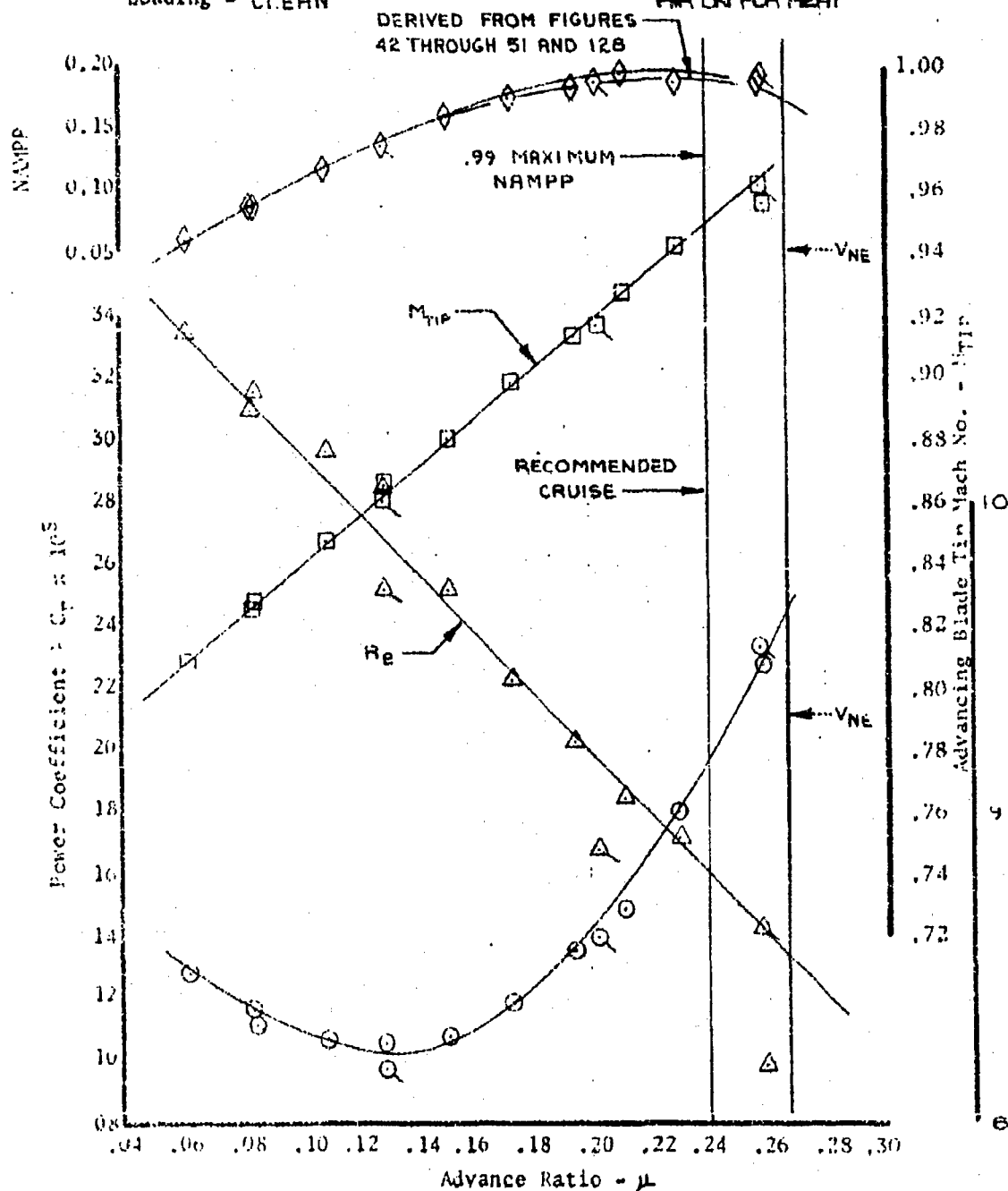


Figure 52. Nondimensional Level Flight Performance

UH-1N USAF S/N 68-10776
T400-CP-400 Engine
Category II

Condition No. = 1
 $C_T = 0.002807$
 $W/\delta_a = 8808$
 $N_R/\sqrt{\sigma_a} = 339.7$
Avg N_R (rpm) = 323.3
Loading = CLEAN

Avg Pressure Altitude (Ft) = 2980
Avg Free Air Temp. ($^{\circ}$ C) = -12.2
Avg Gross Weight (lb) = 7900
Avg cg Location (Sta) = 136.8

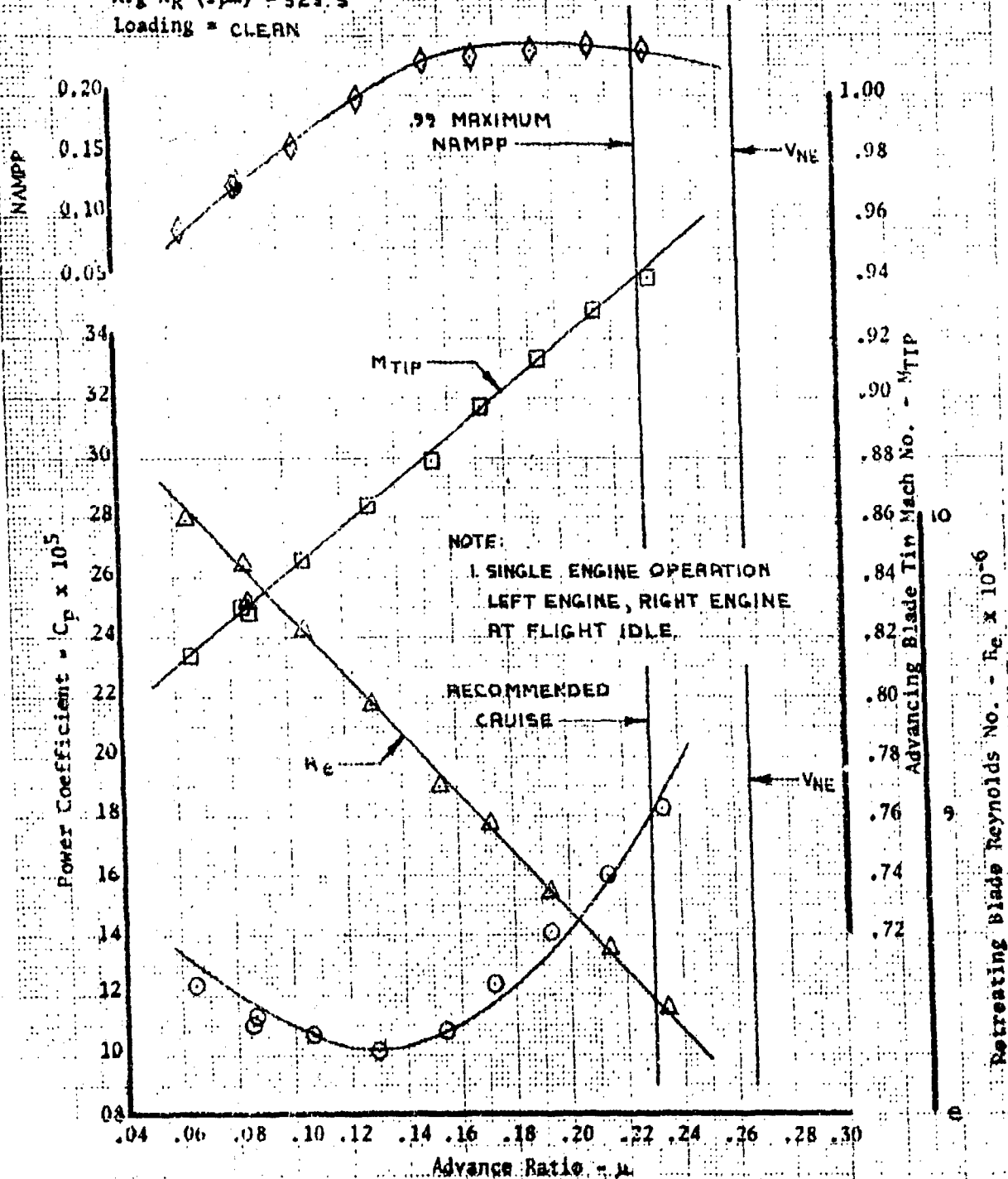


Figure 53. Nondimensional Level Flight Performance

UH-1N USAF S/N 68-10776
T400-CP-400 Engine
Category II

Condition No. = 2
 $C_T = 0.00320786$
 $W/\delta_a = 8885$
 $N_R/\sqrt{\theta_a} = 319.3$
Avg N_R (rpm) = 313.0
Loading = CLEAN

Avg Pressure Altitude (Ft) = 3090
Avg Free Air Temp. ($^{\circ}\text{C}$) = 3.8
Avg Gross Weight (lb) = 7940
Avg cg Location (Sta) = 136.2

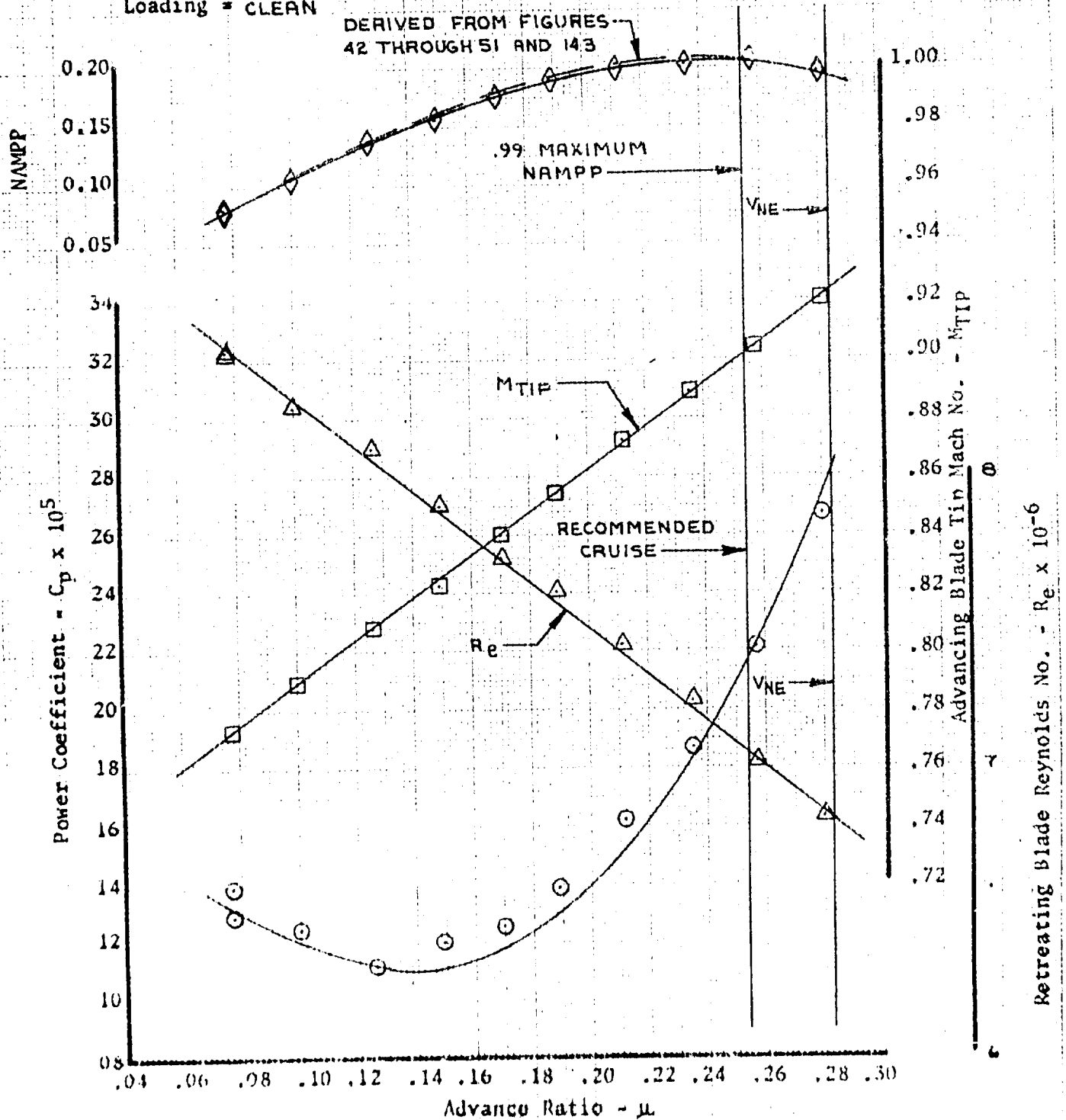


Figure 34 Nondimensional Level Flight Performance

UH-1N USAF S/N 68-10776
T400-CP-400 Engine
Category II

Condition No. = 2
 $C_T = 0.0032524$
 $W/\delta_a = 8,803$
 $N_R/\sqrt{\delta_a} = 318.5$
Avg N_R (rpm) = 312.5
Loading = CLEAN

Avg Pressure Altitude (Ft) = 2760
Avg Free Air Temp. ($^{\circ}\text{C}$) = 4.2
Avg Gross Weight (Lb) = 7,960
Avg cg Location (Sta) = 185.1

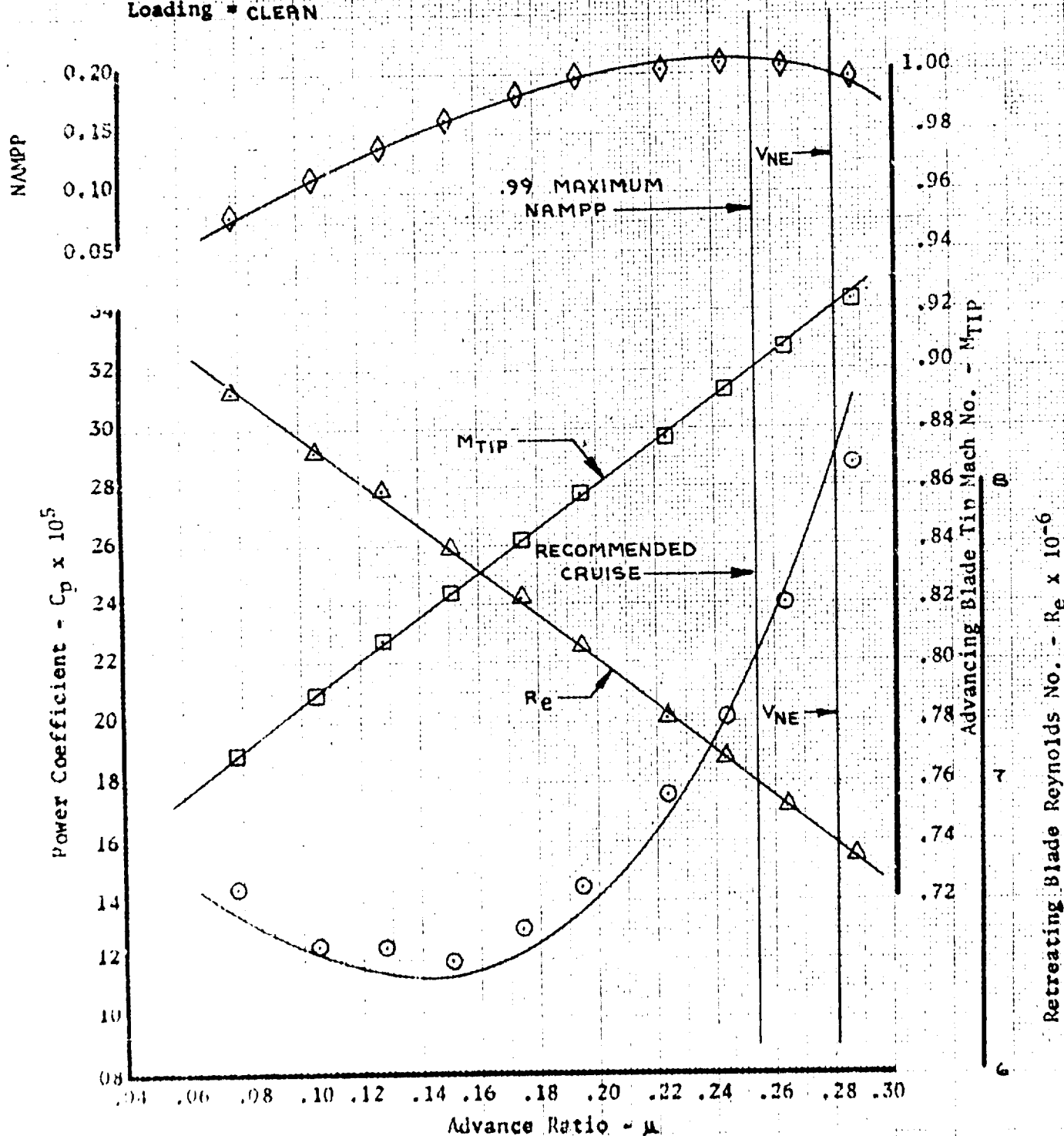


Figure 55. Nondimensional Level Flight Performance

UH-1N USAF S/N 68-10776
T400-CP-400 Engine
Category II

Condition No. = 2A
C_T = 0032094
N/δ_a = 7,846
N_R/√δ_a = 299.9
Avg N_R (rpm) = 303.1
Loading = CLEAN

Avg Pressure Altitude (Ft) = 940
Avg Free Air Temp. (°C) = 2.0
Avg Gross Weight (Lb) = 7,580
Avg cg Location (Sta) = 137.7

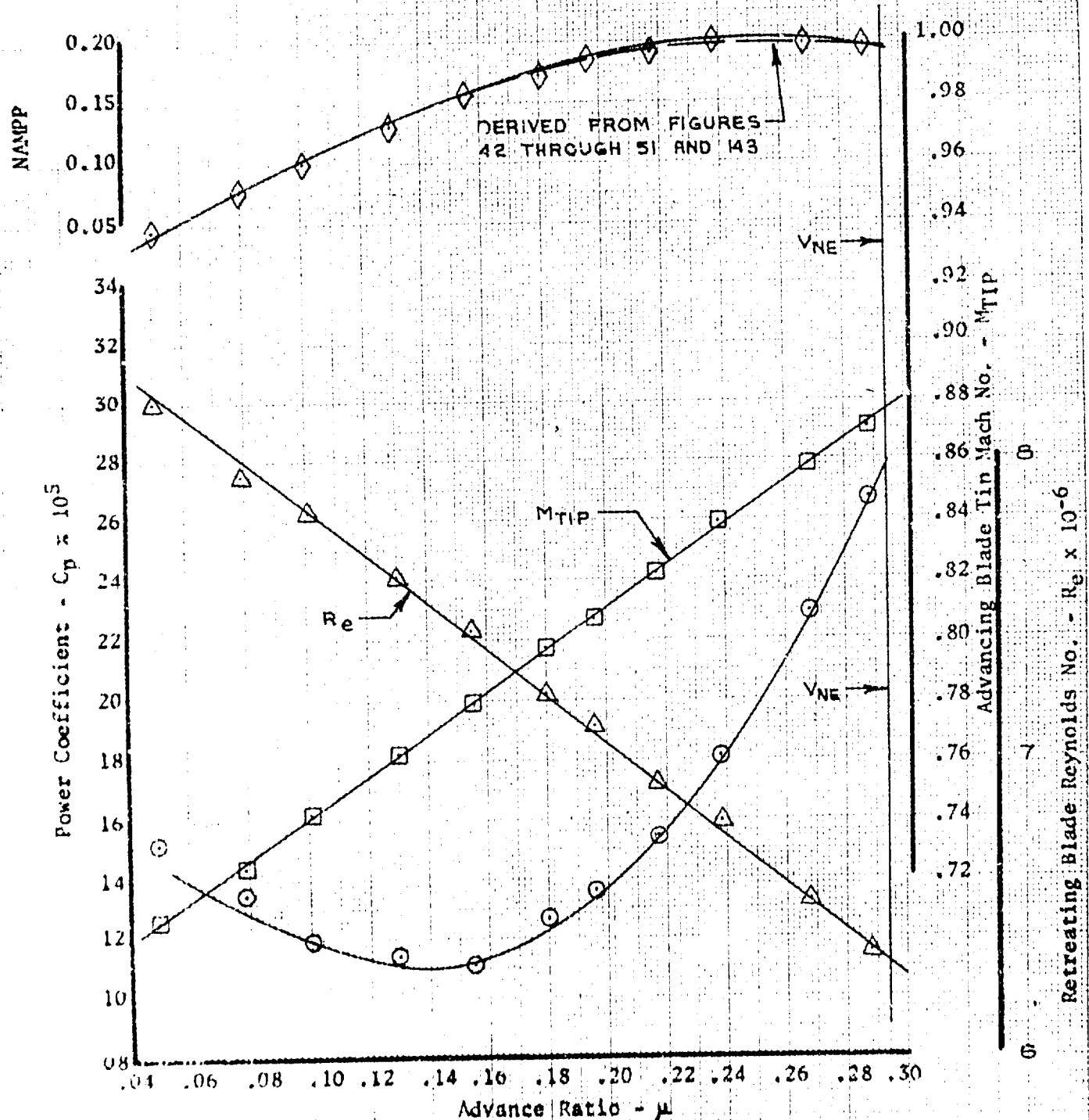


Figure 36. Nondimensional Level Flight Performance

U1-1N USAF S/N 68-10776

T400-CP-400 Engine

Category II

Condition No. = 28

$C_T = 0.0032071$

$W/\delta_a = 8375$

$N_R/\sqrt{\theta_a} = 310.0$

Avg N_R (rpm) = 312.7

Loading = CLEAN

Avg Pressure Altitude (Ft) = 1370

Avg Free Air Temp. ($^{\circ}$ C) = 20.0

Avg Gross Weight (Lb) = 7970

Avg cg Location (Sta) = 138.7

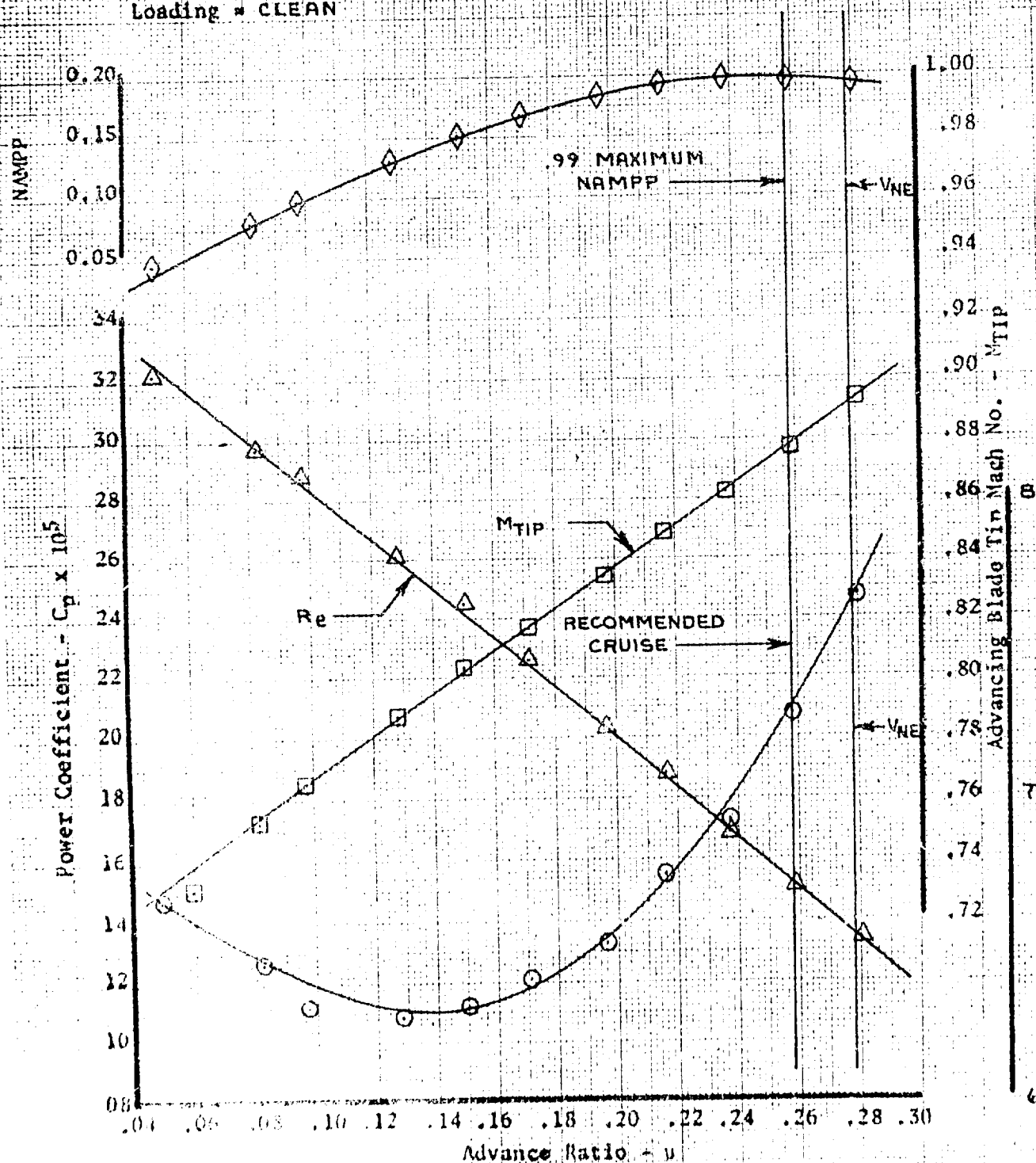


Figure 5.1. Dimensional Level Flight Performance

Category II

LOADING - CLEAN

Avg cg location (Sta) = 135.0

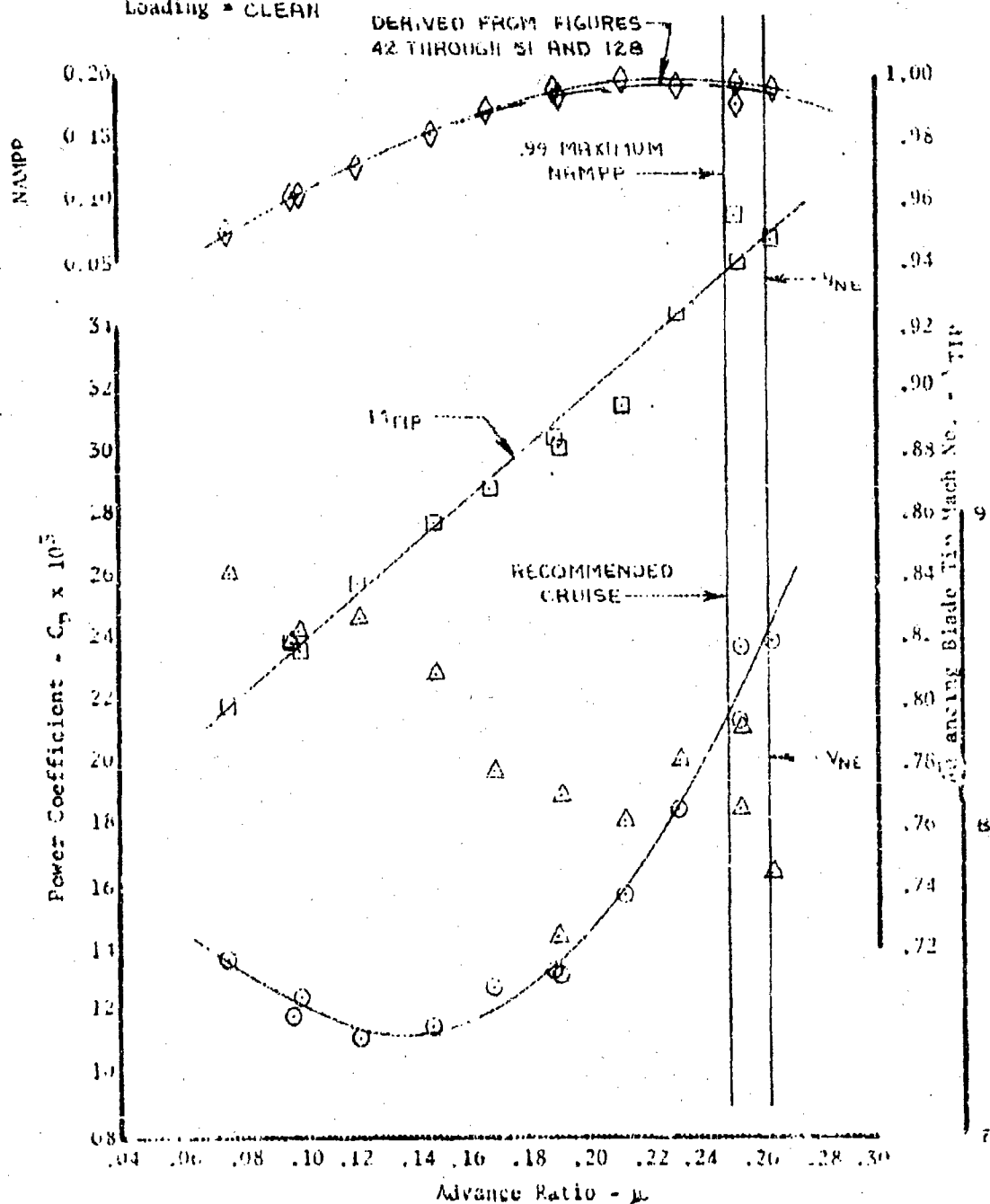


Figure 56. Nondimensional Level Flight Performance

U11-IN USAF S/N 68-10776

T400-CP-400 Engine

Category II

Condition No. = 3

$C_T = 0.0052256$

$W/\delta_a = 9497$

$N_R/\sqrt{\delta_a} = 329.0$

Avg N_R (rpm) = 311.7

Loading = CLEAN

Avg Pressure Altitude (Ft) = 3420

Avg Free Air Temp. ($^{\circ}\text{C}$) = -14.6

Avg Gross Weight (Lb) = 8380

Avg cg Location (Sta) = 139.9

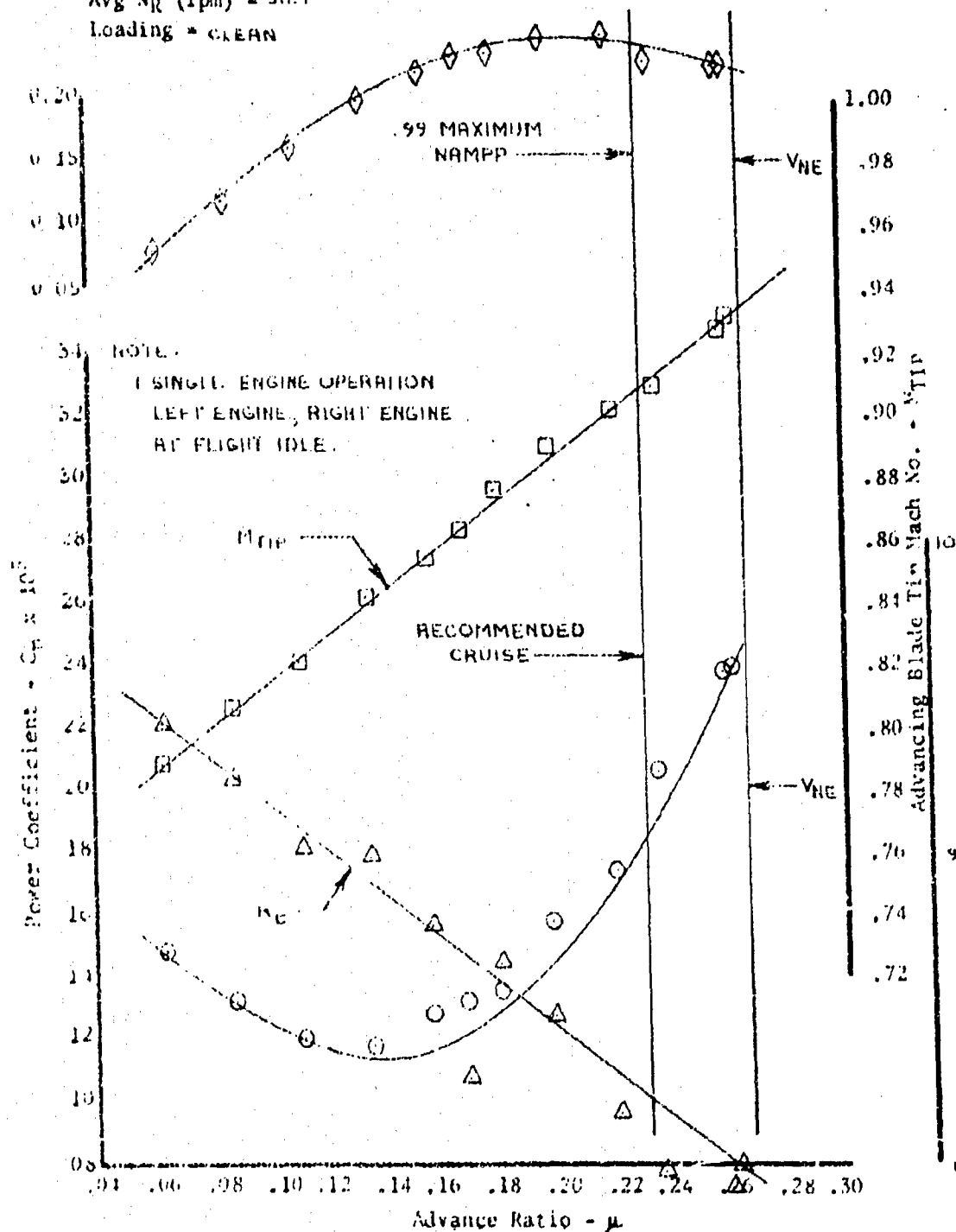


Figure 59 Nondimensional Level Flight Performance

UH-1N USAF S/N 68-10776

T400-CP-400 Engine

Category II

Condition No. = 3

$C_T = 0.003187$

$W/S_a = 9455$

$NR/\sqrt{\sigma} = 330.3$

Avg NR (rpm) = 316.2

Loading = CLEAN

Avg Pressure Altitude (Ft) = 2410

Avg Free Air Temp. ($^{\circ}C$) = -9.0

Avg Gross Weight (Lb) = 8660

Avg cg Location (Sta) = 138.5

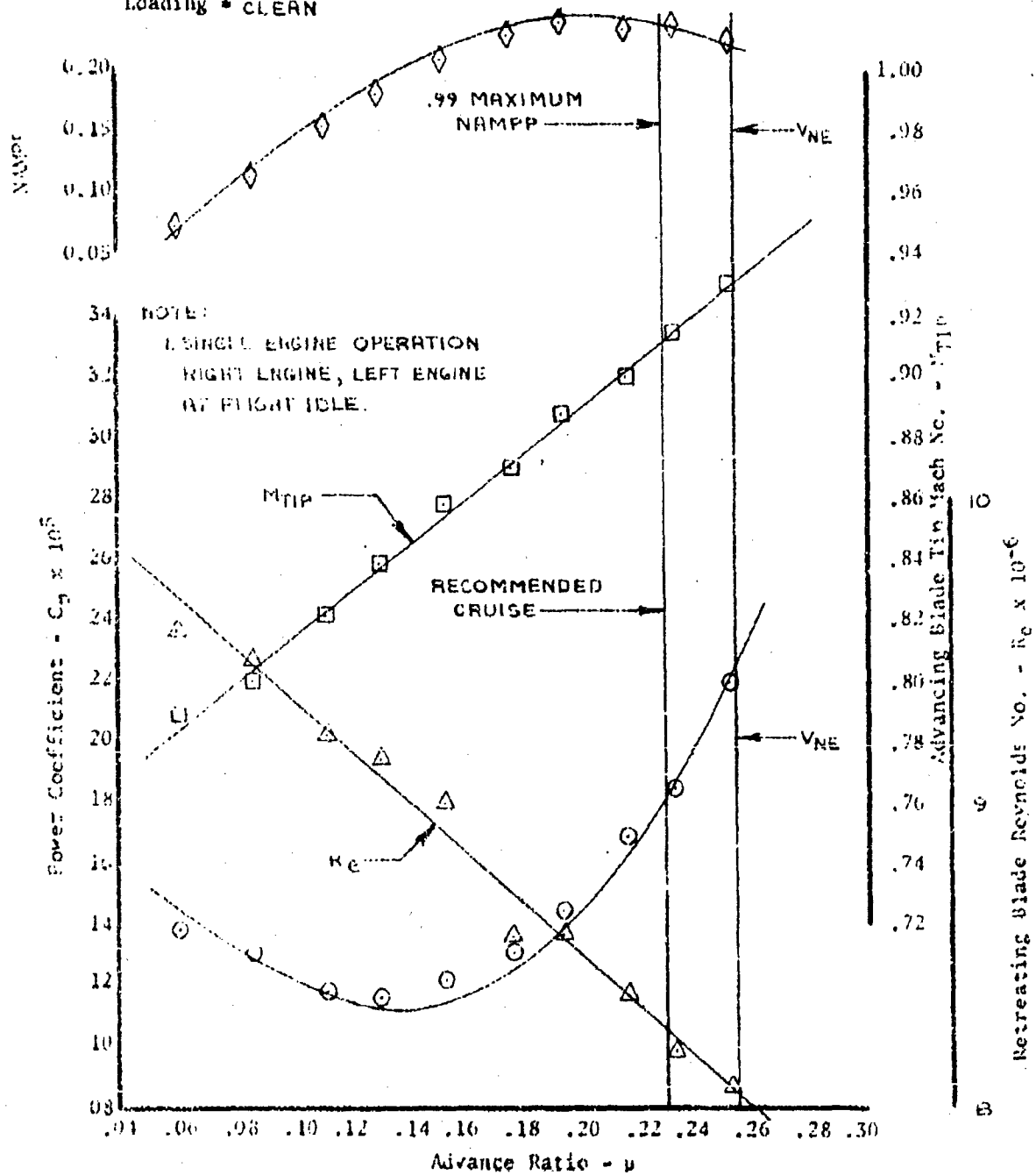


Figure 60. Nondimensional Level Flight Performance

U-1N USAF S/N 68-10776

T400-CP-400 Engine

Category II

Condition No. = 4

$C_T = 0.003169$

$W/\delta_a = 9507$

$N_R/\delta_a = 554.1$

Avg N_R (rpm) = 3239

Loading = CLEAN

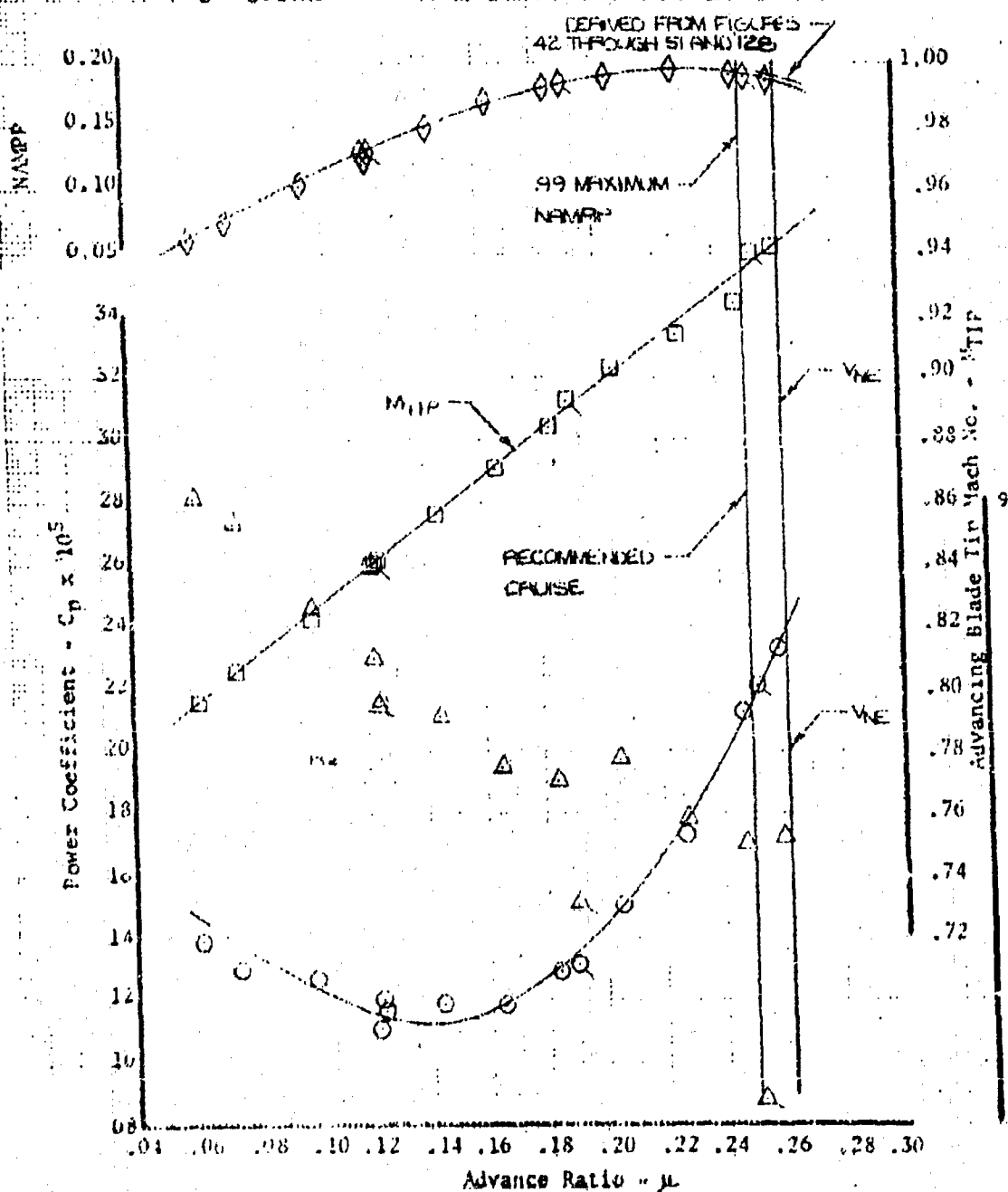
Avg Pressure Altitude (ft) = 3260

Avg Free Air Temp. ($^{\circ}$ C) = 0.0

Avg Gross Weight (lb) = 8310

Avg cg Location (Sta) = 136.5

NOTE - TAILED SYMBOLS INDICATE BLEED
AIR ON FOR HEAT



UH-1N USAF S/N 68-10776
T400-CP-400 Engine
Category II

Condition No. = 5

$C_T = 0.003205$

$W/\delta_a = 3936$

$Nr/\sqrt{\sigma_a} = 337.8$

Avg Nr (rpm) = 311.2

Loading = CLEAN

Avg Pressure Altitude (Ft) = 4470

Avg Free Air Temp. ($^{\circ}C$) = -28.6

Avg Gross Weight (Lb) = 8430

Avg cg Location (Sta) = 138.0

NOTE - TAILED SYMBOLS INDICATE BLEED
AIR ON FOR HEAT

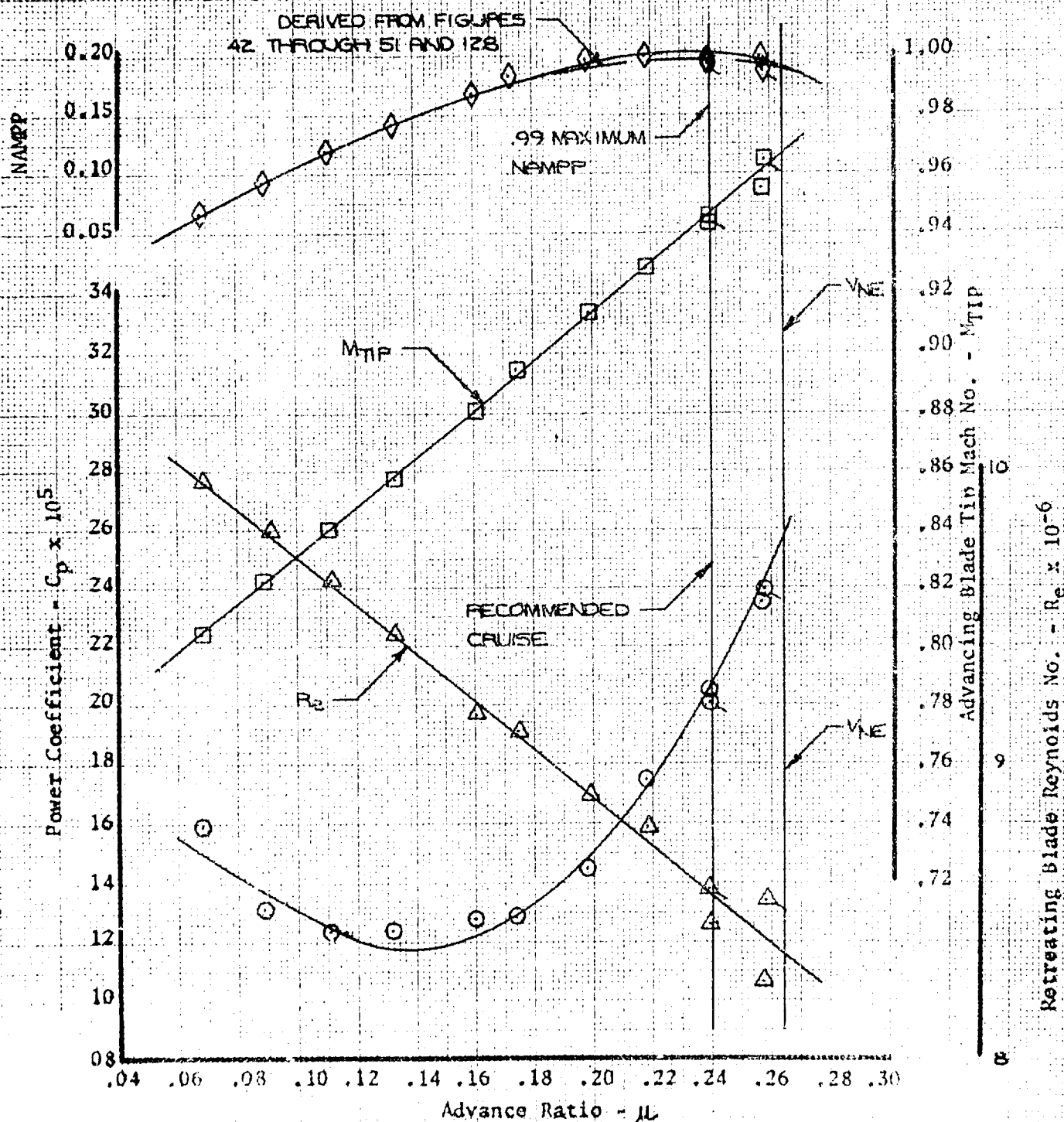


Figure 62. Nondimensional Level Flight Performance

UH-1N USAF S/N 68-10776
T400-CP-400 Engine
Category II

Condition No. = 6
 $C_T = 0.003233$
 $W/\delta_a = 10,076$
 $N_R/\sqrt{\delta_a} = 338.6$
Avg N_R (rpm) = 313.9
Loading = CLEAN

Avg Pressure Altitude (Ft) = 5,760
Avg Free Air Temp. ($^{\circ}$ C) = -25.5
Avg Gross Weight (Lb) = 8,550
Avg cg Location (Sta) = 139.7
NOTE - TAILED SYMBOLS INDICATE BLEED
AIR ON FOR HEAT

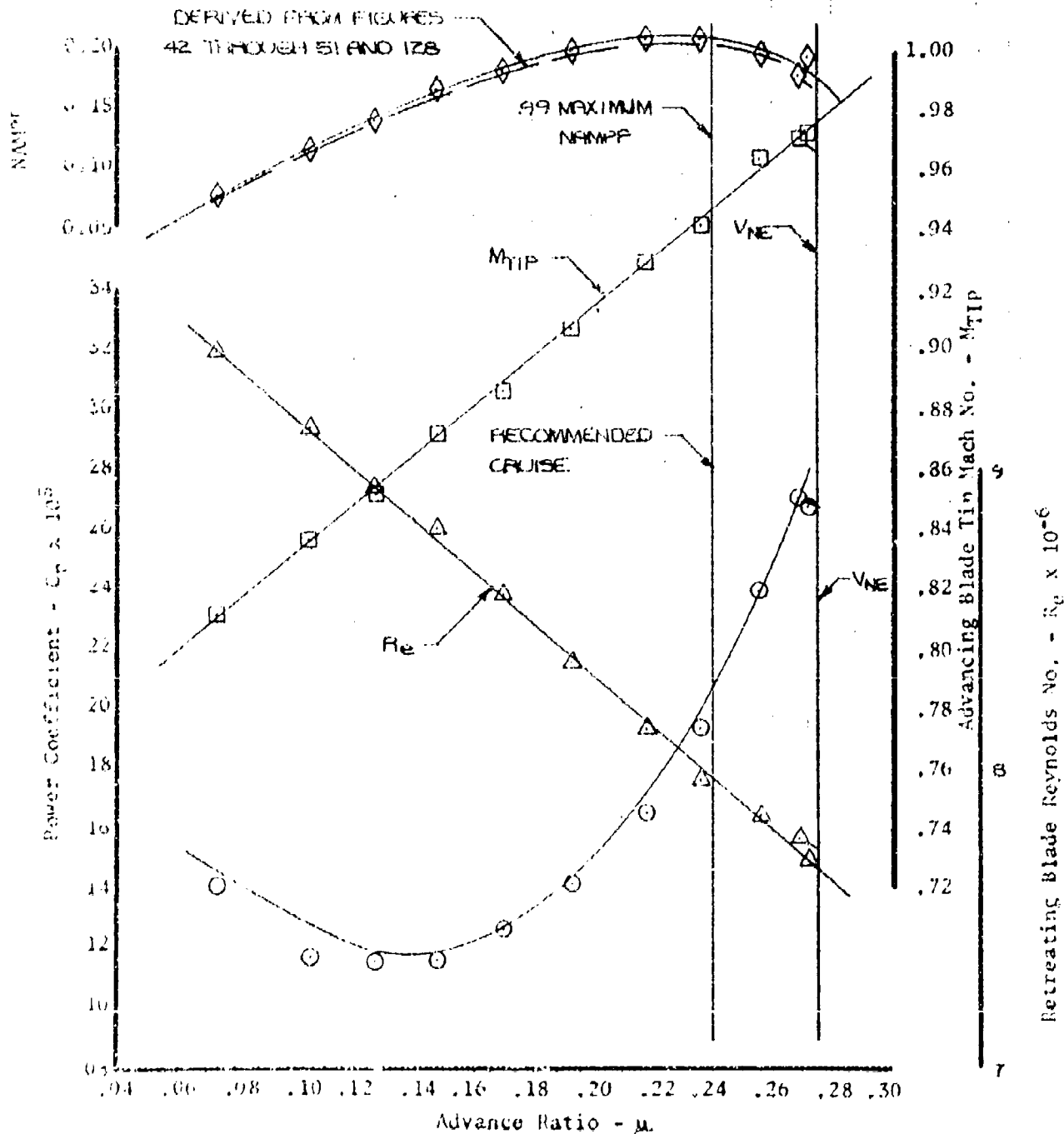


Figure 6.3 Nondimensional Level Flight Performance

UH-1N USAF S/N 68-10776

T400-CP-400 Engine

Category II

Condition No. = 7

$C_p = 0.0031622$

$W/\sigma_a = 10,091$

$N_R/\sqrt{\sigma_a} = 341.4$

Avg N_R (rpm) = 315.1

Loading = CLEAN

Avg Pressure Altitude (Ft) = 4500

Avg Free Air Temp. ($^{\circ}\text{C}$) = -27.6

Avg Gross Weight (Lb) = 8560

Avg cg Location (Sta) = 138.4

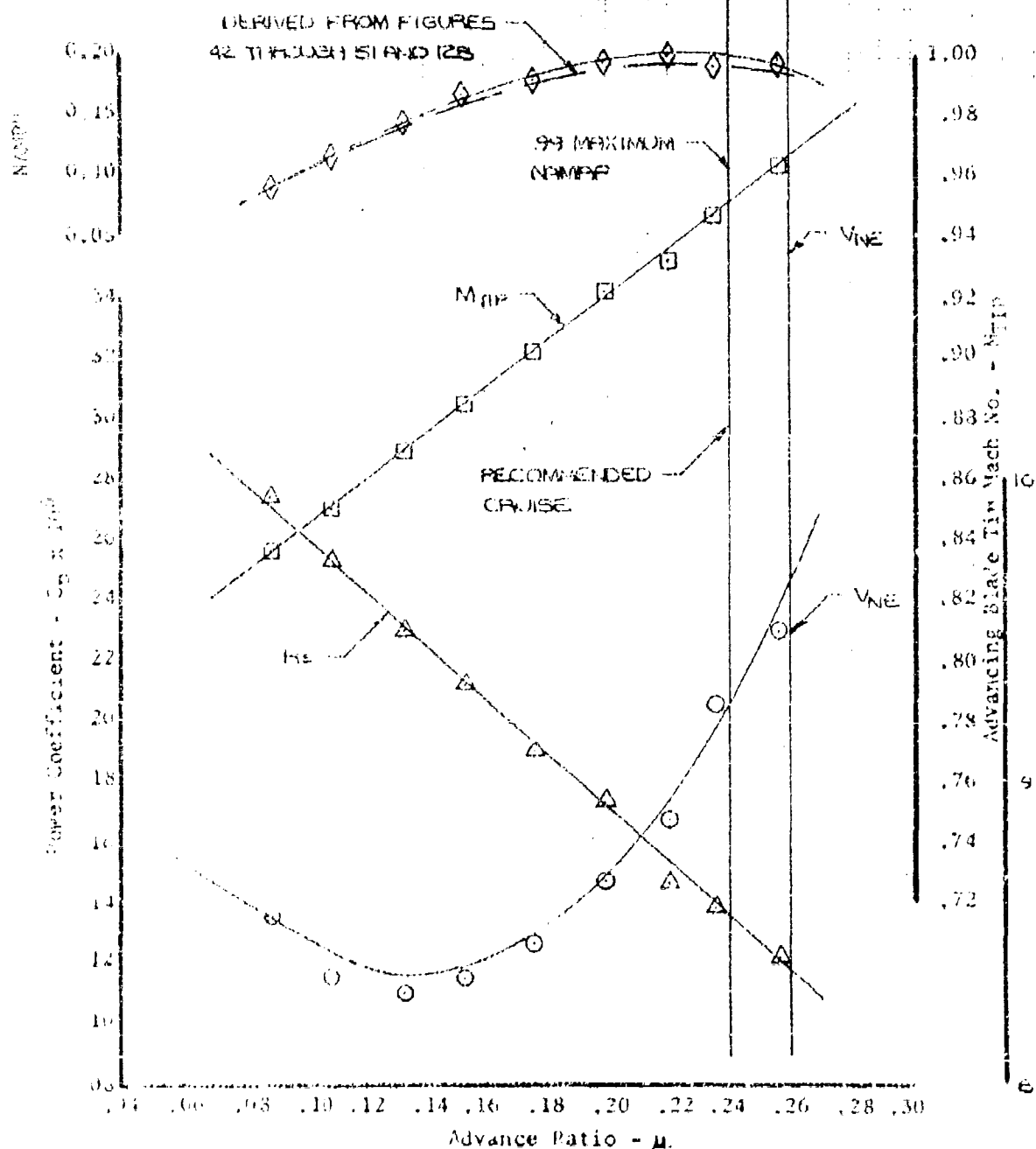


Figure C.4. Nondimensional Level Flight Performance

UH-1N USAF S/N 68-10776

T400-CP-400 Engine

Category II

Condition No. = 8

$C_T = .0036061$

$W/\delta_a = 8823$

$N_R/\sqrt{\delta_a} = 300.1$

Avg N_R (rpm) = 305.0

Loading = CLEAN

Avg Pressure Altitude (Ft) = 710

Avg Free Air Temp. ($^{\circ}\text{C}$) = 24.3

Avg Gross Weight (Lb) = 8,600

Avg cg Location (Sta) = 136.0

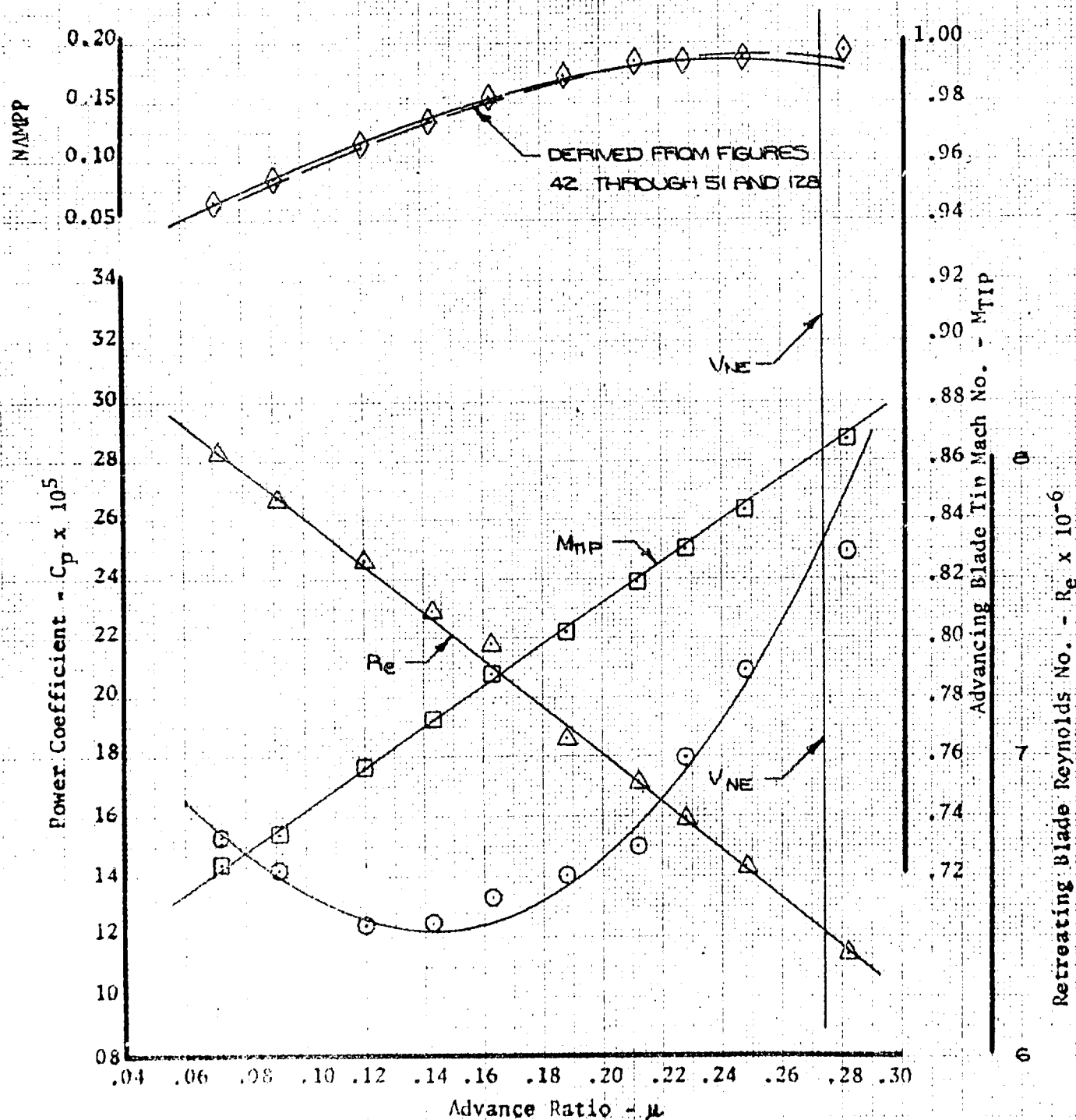


Figure 63. Nondimensional Level Flight Performance

UH-1N USAF S/N 68-10776
T400-CP-400 Engine
Category II

Condition No. = 9
 $C_T = .0036242$
 $W/\delta_a = 9,448$
 $N_R/\rho a = 309.7$
 Avg N_R (rpm) = 314.3
 Loading = CLEAN

Avg Pressure Altitude (Ft) = 970
 Avg Free Air Temp. ($^{\circ}$ C) = 23.5
 Avg Gross Weight (lb) = 9,120
 Avg cg Location (Sta) = 137.9

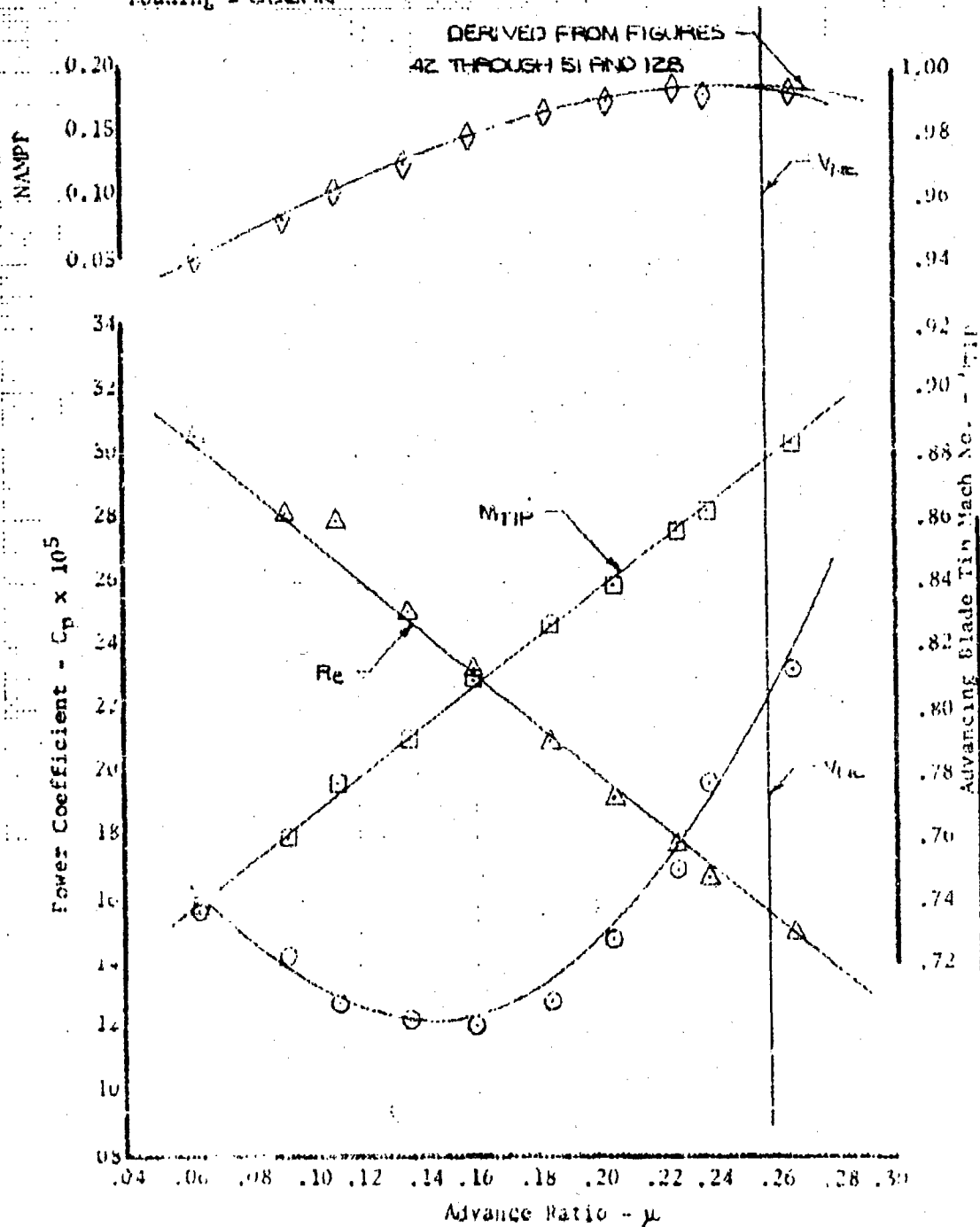


Figure 46 Non-dimensional Level Flight Performance

UH-1N USAF S/N 68-10776
T400-CP-400 Engine
Category II

Condition No. = 10
CT = 0.003576
W/δ_a = 10019
N_R/√δ_a = 321.1
Avg N_R (rpm) = 312.4
Loading = CLEAN

Avg Pressure Altitude (Ft) = 5510
Avg Free Air Temp. (°C) = -0.4
Avg Gross Weight (Lb) = 8180
Avg cg Location (Sta) = 137.0

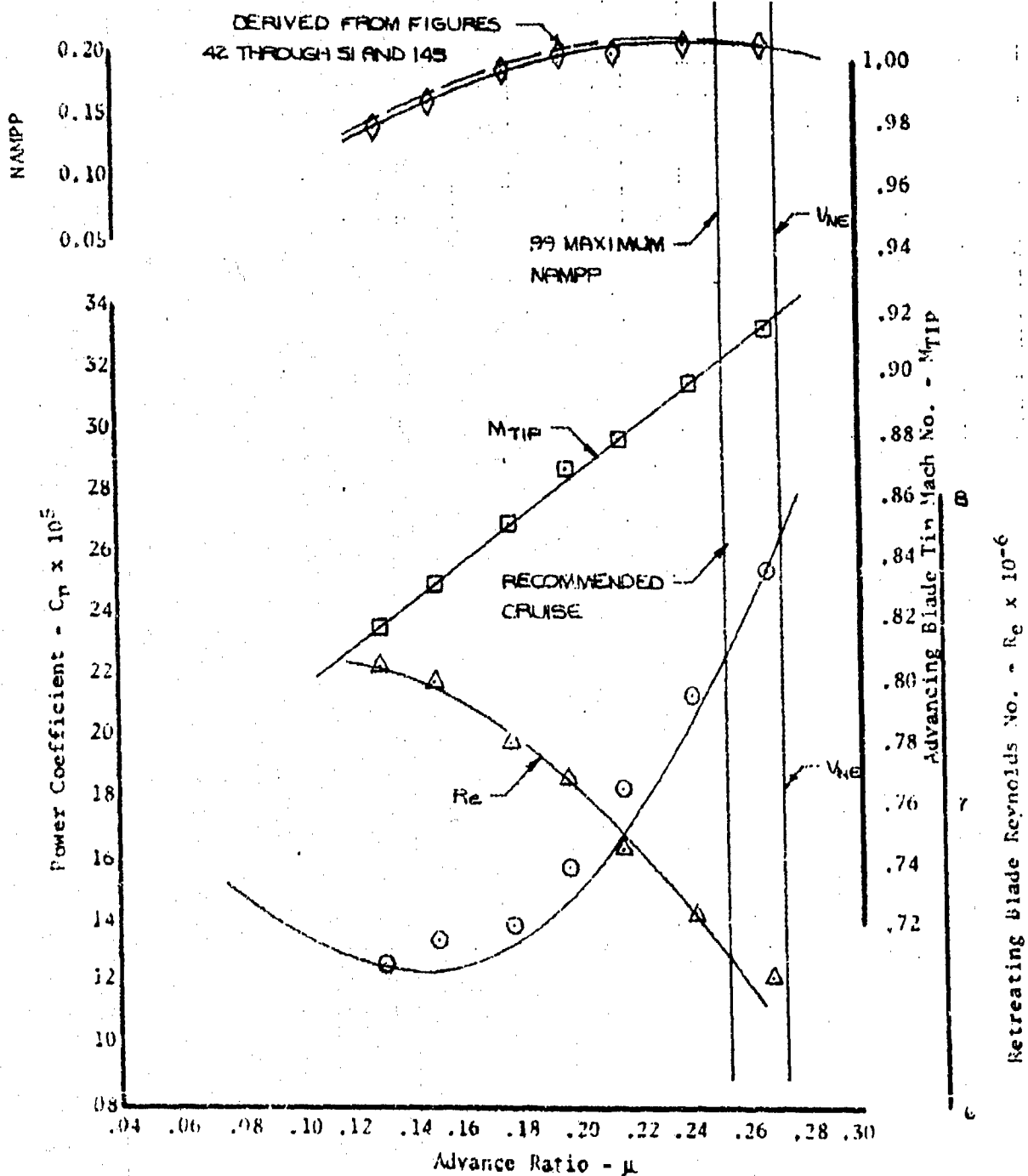


Figure 47 Nondimensional Level Flight Performance

UH-1N USAF S/N 68-10776
T400-CP-400 Engine
Category II

Condition No. = 10A
C_T = 0.00358826
N/δ_a = 10,020
N_R/√δ_a = 319.3
Avg N_R (rpm) = 320.1
Loading = CLEAN

Avg Pressure Altitude (Ft) = 4420
Avg Free Air Temp. (°C) = 16.4
Avg Gross Weight (lb) = 8,520
Avg cg Location (Sta) = 136.1

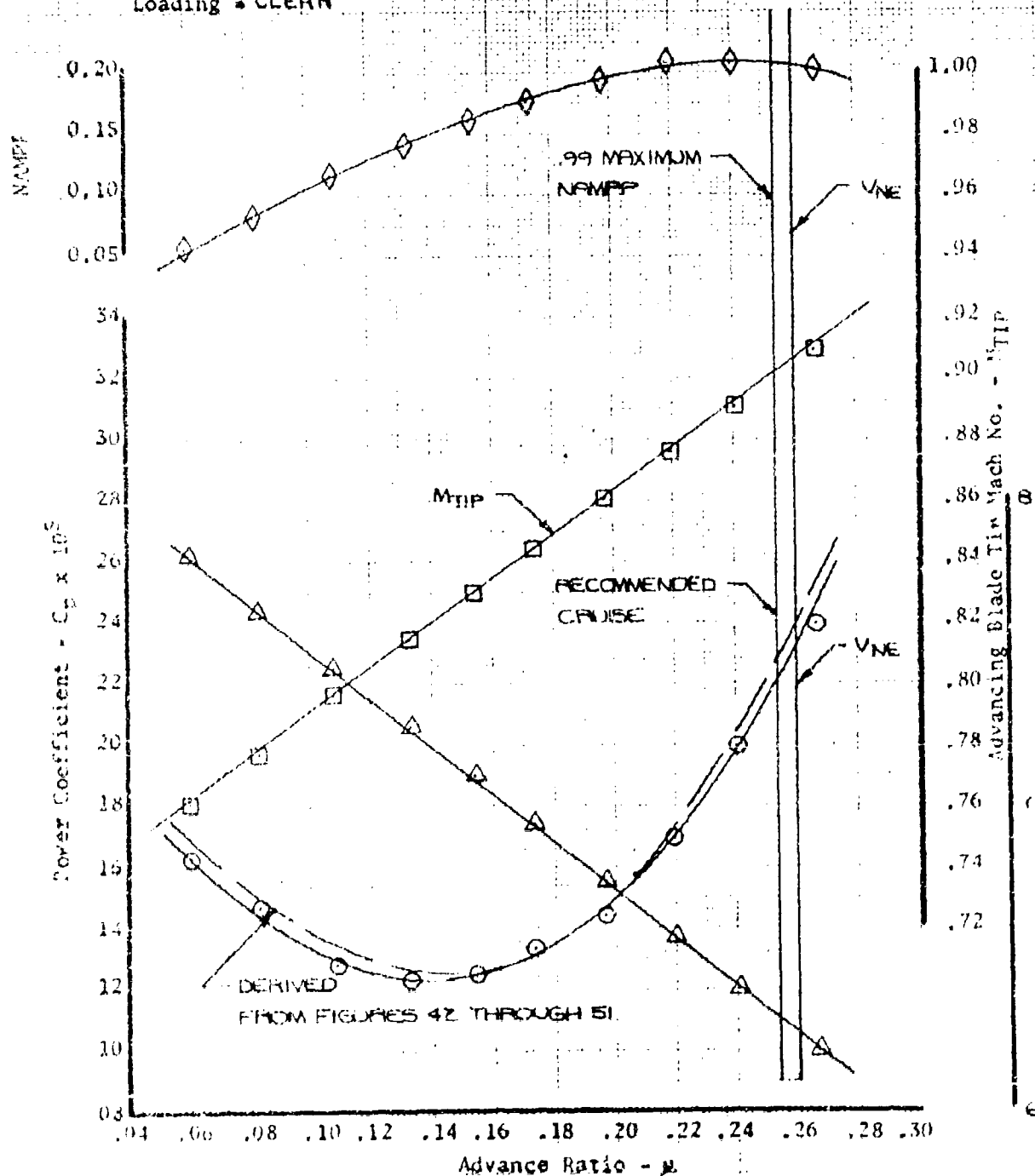


Figure 68. Nondimensional Level Flight Performance

UH-1N USAF S/N 68-10776
T400-CP-400 Engine
Category II

Condition No. = 10
 $C_T = 0.00360301$
 $W/\delta_a = 10037$
 $N_R/\sqrt{\delta_a} = 320.1$
Avg N_R (rpm) = 312.8
Loading = CLEAN

Avg Pressure Altitude (Ft) = 4650
Avg Free Air Temp. ($^{\circ}$ C) = 2.1
Avg Gross Weight (Lb) = 8460
Avg cg Location (Sta) = 138.0
NOTE - BLEED AIR FOR HEAT ON

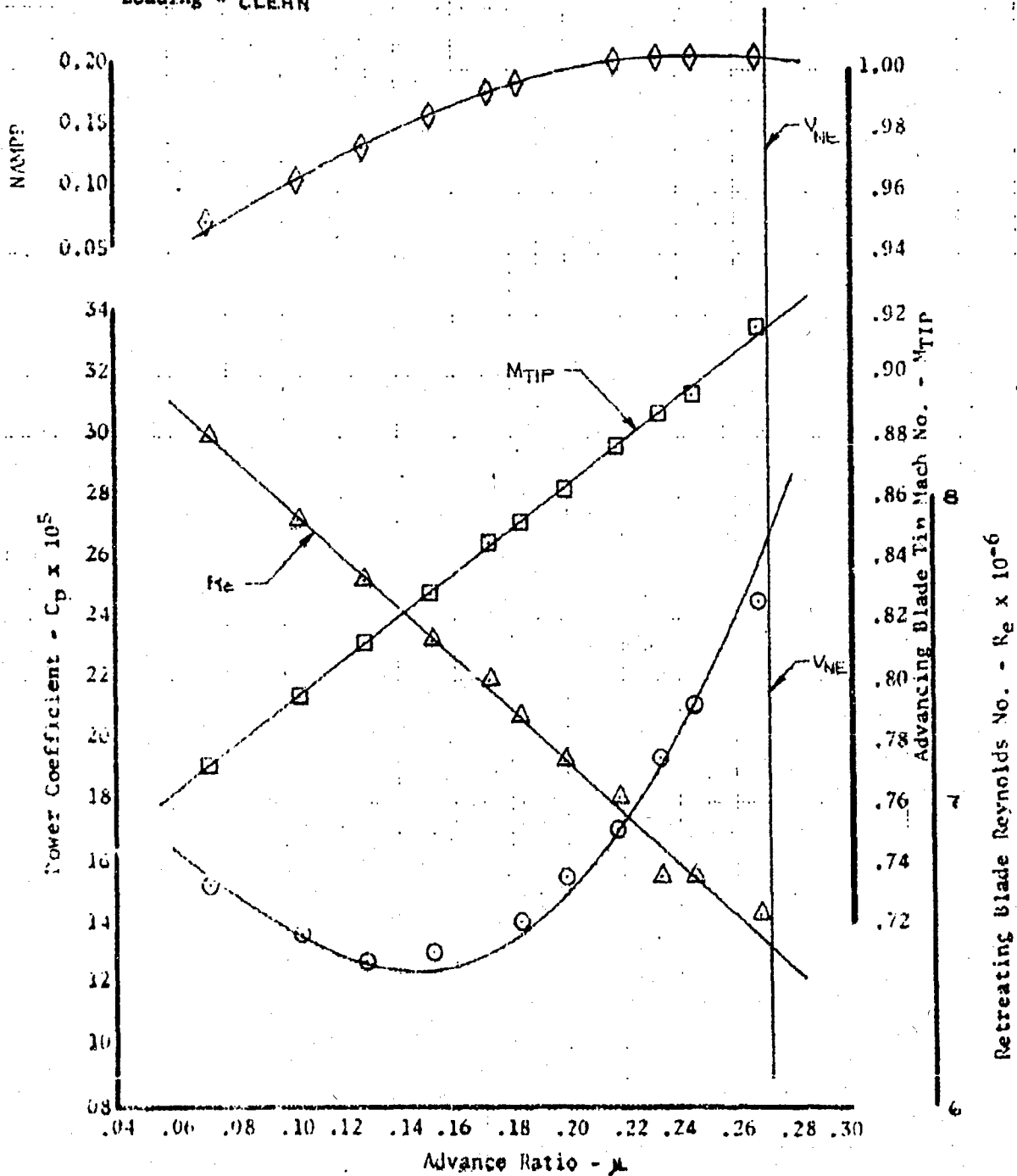


Figure 69 Nondimensional Level Flight Performance

UH-1N USAF S/N 68-10776
T400-CP-400 Engine
Category II

Condition No. = 10
Ct = 0.0036202
W/δa = 10,167
NR/δa = 319.8
Avg Nr (rpm) = 316.3
Loading = CLEAN - FORWARD C.G. LOCATION

Avg Pressure Altitude (Ft) = 4,220
Avg Free Air Temp. (°C) = 8.7
Avg Gross Weight (Lb) = 8,580
Avg cg Location (Sta) = 130.1 (FWD)

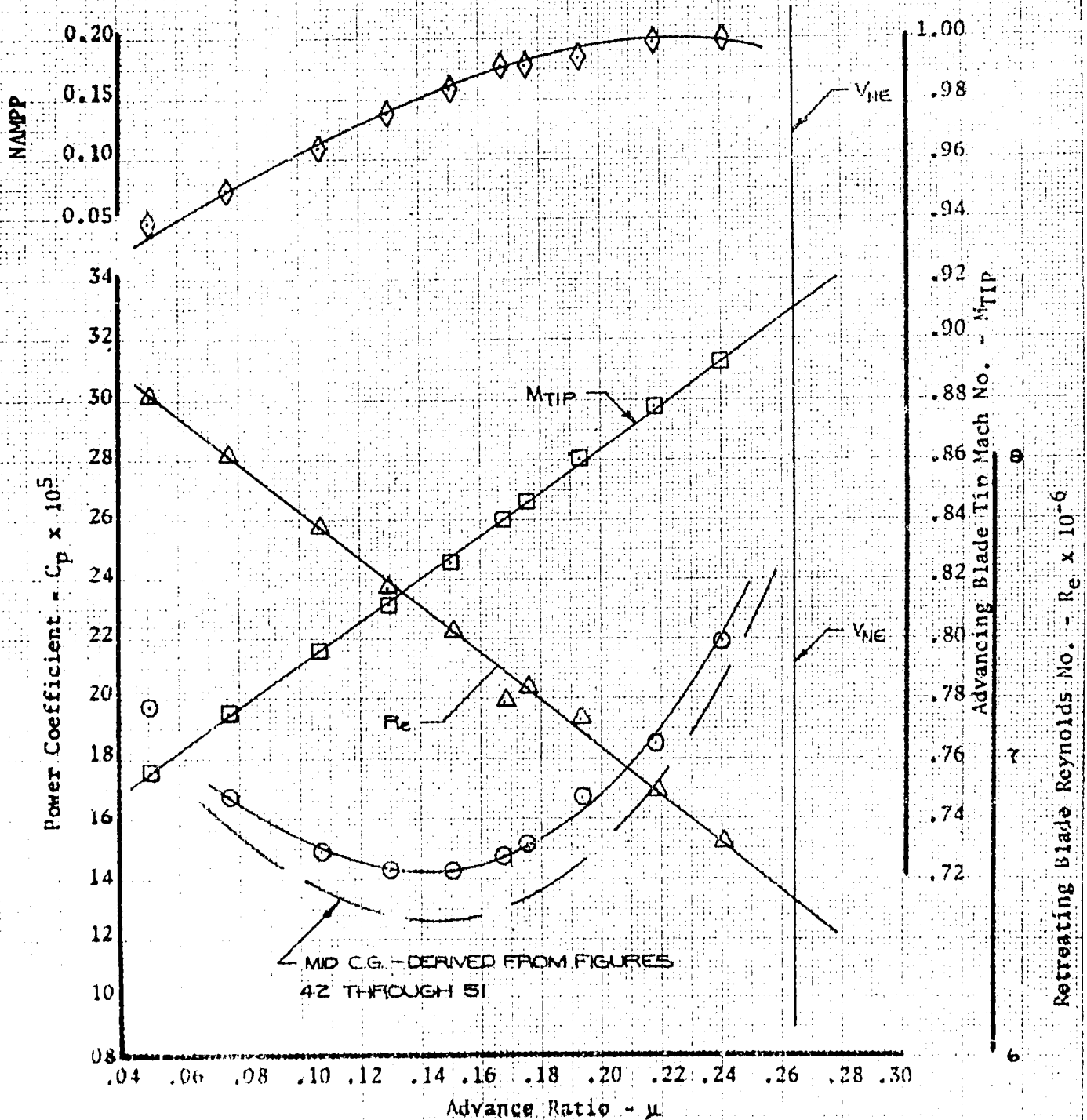


Figure 70 Nondimensional Level Flight Performance

UH-1N USAF S/N 68-10776
T400-CP-400 Engine
Category II

Condition No. = 10

$C_T = 0.0035515$

$W/\delta_a = 9.976$

$N_R/\sqrt{\delta_a} = 922.2$

Avg N_R (rpm) = 316.7

Loading = CLEAN - AFT C.G. LOCATION

Avg Pressure Altitude (Ft) = 4300

Avg Free Air Temp. ($^{\circ}$ C) = 4.6

Avg Gross Weight (Lb) = 8,520

Avg cg Location (Sta) = 142.9 (AFT)

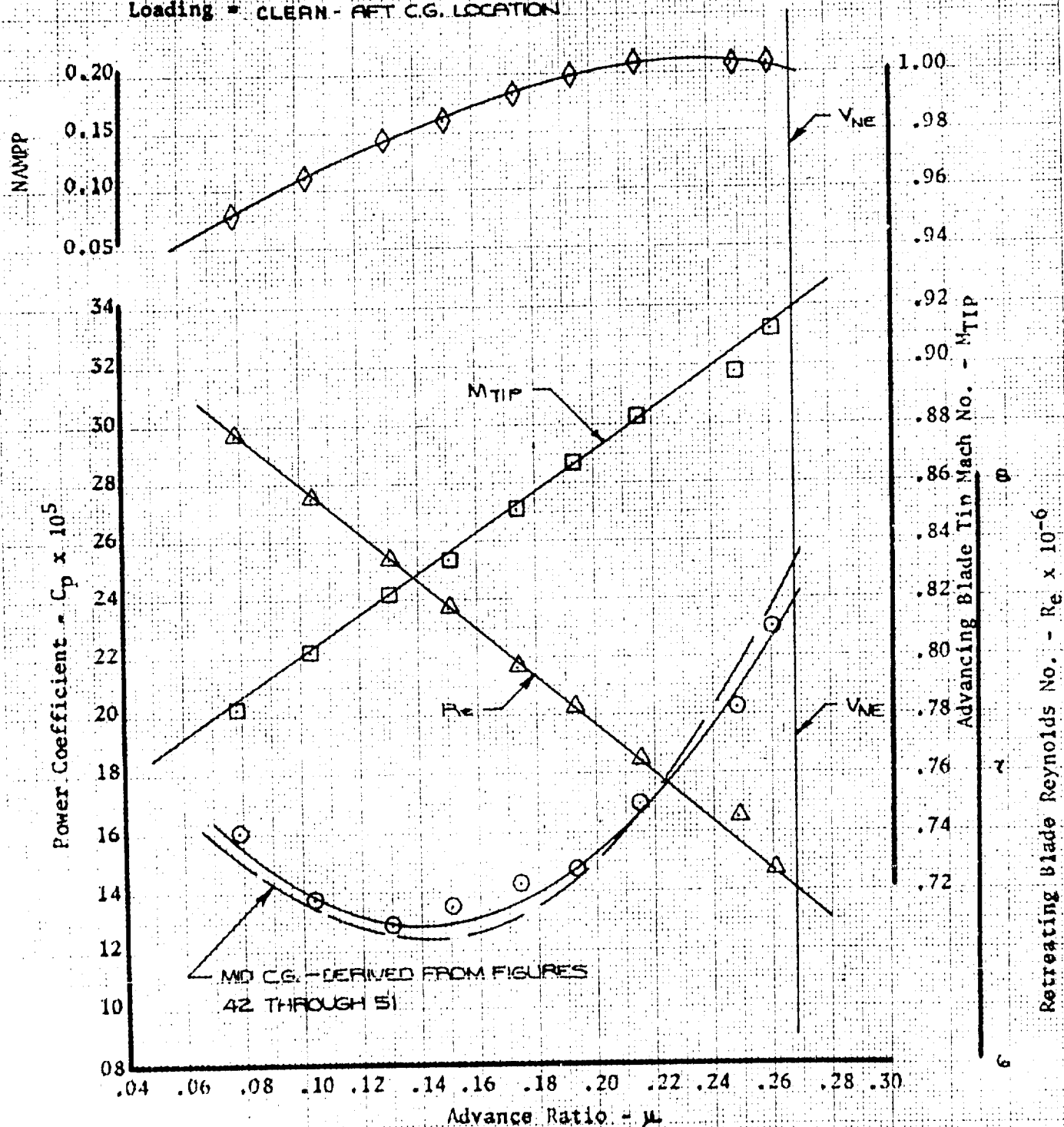


Figure 71. Nondimensional Level Flight Performance

UH-1N USAF S/N 68-10776
 T400-CP-400 Engine
 Category II

Condition No. = 11
 $C_T = 0.003625$
 $W/\delta_a = 10,846$
 $NR/\sqrt{\sigma_a} = 931.8$
 Avg N_R (rpm) = 321.1
 Loading = CLEAN

Avg Pressure Altitude (Ft) = 7900
 Avg Free Air Temp. ($^{\circ}C$) = -3.3
 Avg Gross Weight (lb) = 8500
 Avg cg Location (Sta) = 136.8

NOTE - TAILED SYMBOLS INDICATE BLEED ON FOR HEAT

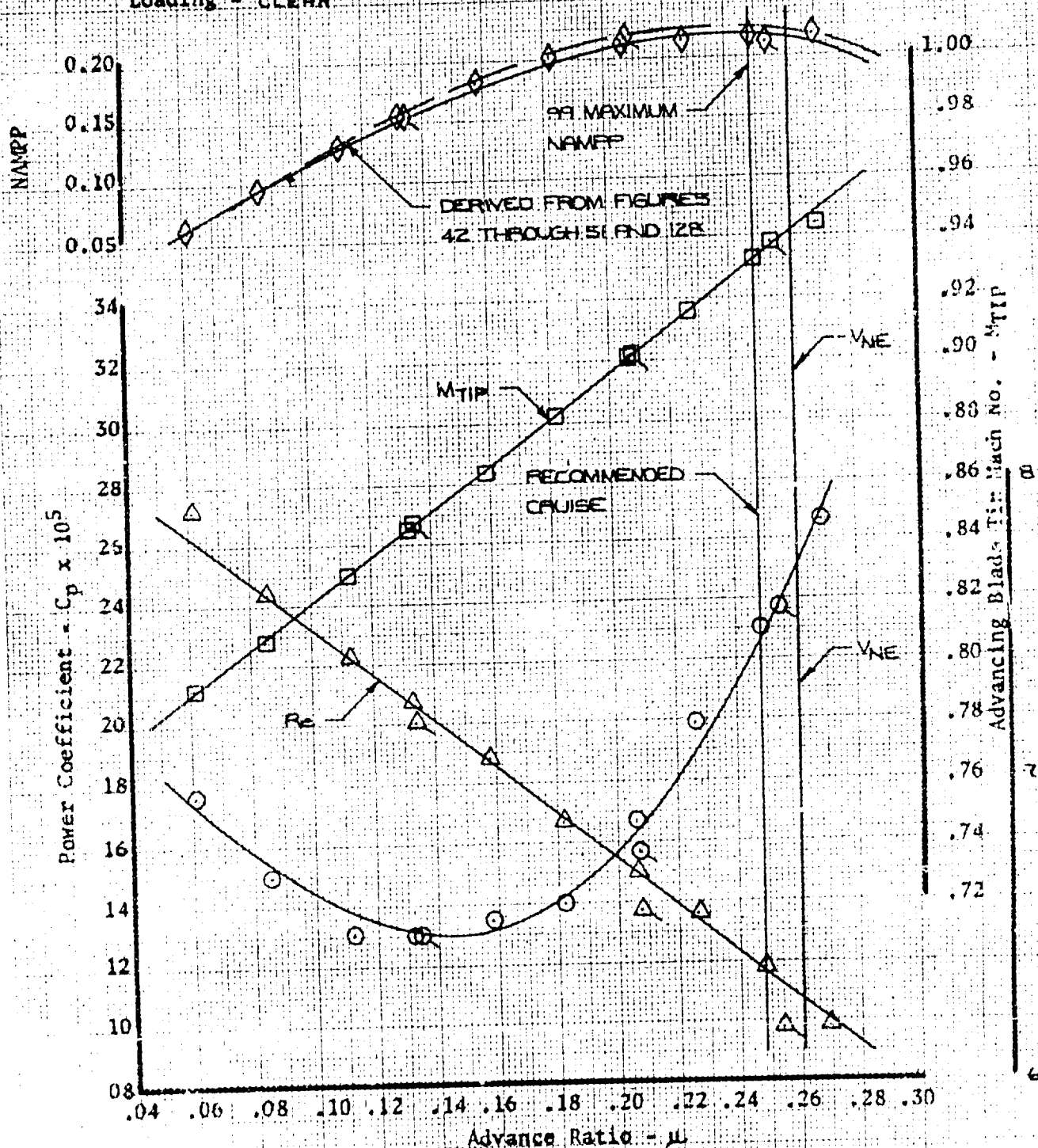


Figure 72. Nondimensional Level Flight Performance

UH-1N USAF S/N 68-10776

T400-CP-400 Engine

Category II

Condition No. = 12

$C_T = 0.0036$

$W/\delta_a = 11,481$

$NR/\sqrt{\theta_a} = 340.0$

Avg NR (rpm) = 319.4

Loading = CLEAN

Avg Pressure Altitude (Ft) = 10,070

Avg Free Air Temp. ($^{\circ}\text{C}$) = -19.7

Avg Gross Weight (Lb) = 7,840

Avg cg Location (Sta) = 138.8

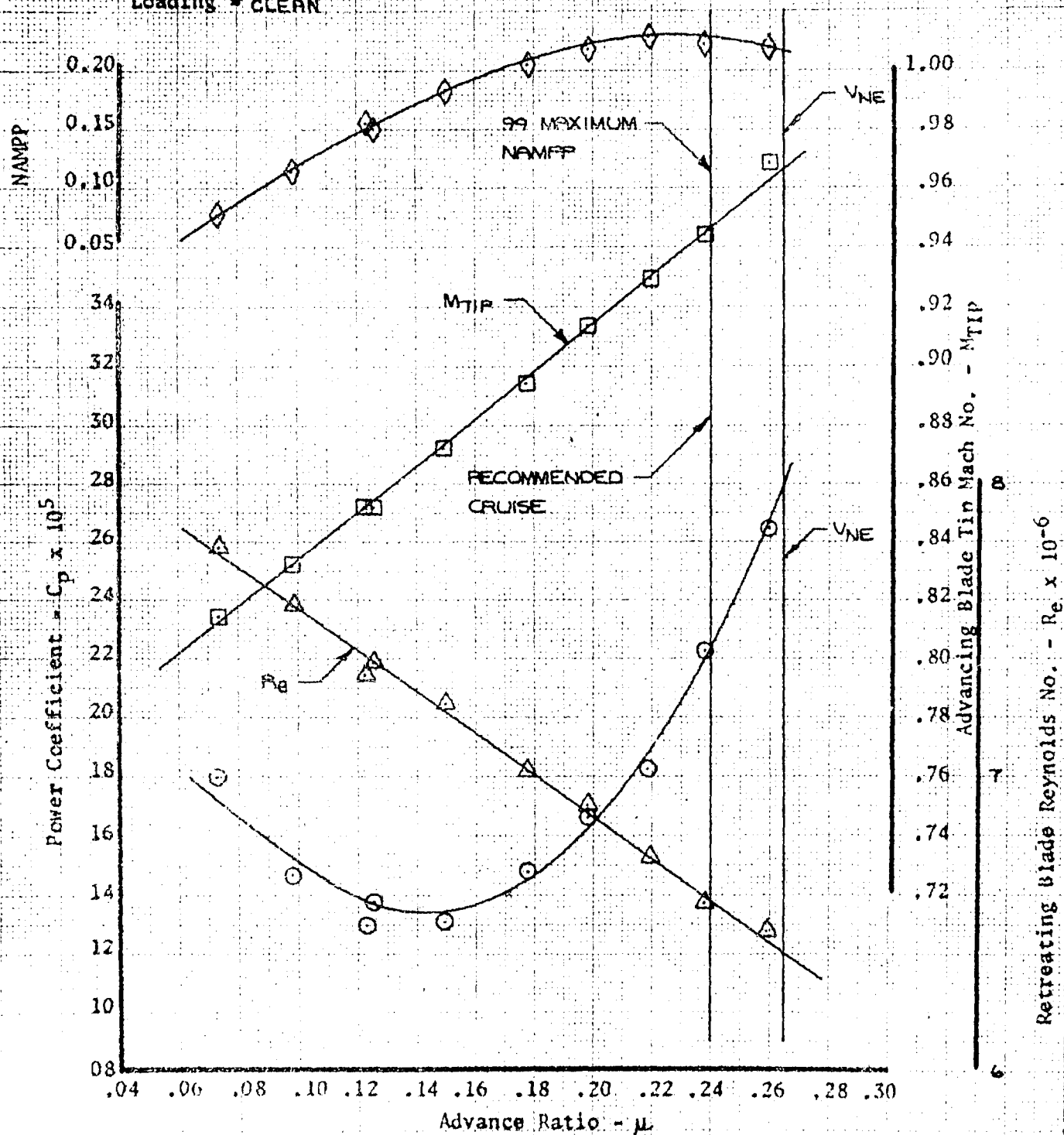


Figure 73. Nondimensional Level Flight Performance

UH-1N USAF S/N 68-10776
T400-CP-400 Engine
Category II

Condition No. = 12
 $C_T = 0.0036$
 $W/\delta_a = 11.5 \pm 2$
 $N_R/\sqrt{\delta_a} = 340.0$
 Avg N_R (rpm) = 3200
 Loading = CLEAN

Avg Pressure Altitude (Ft) = 9,790
 Avg Free Air Temp, ($^{\circ}$ C) = -17.8
 Avg Gross Weight (Lb) = 6,030
 Avg cg location (Sta) = 136.1

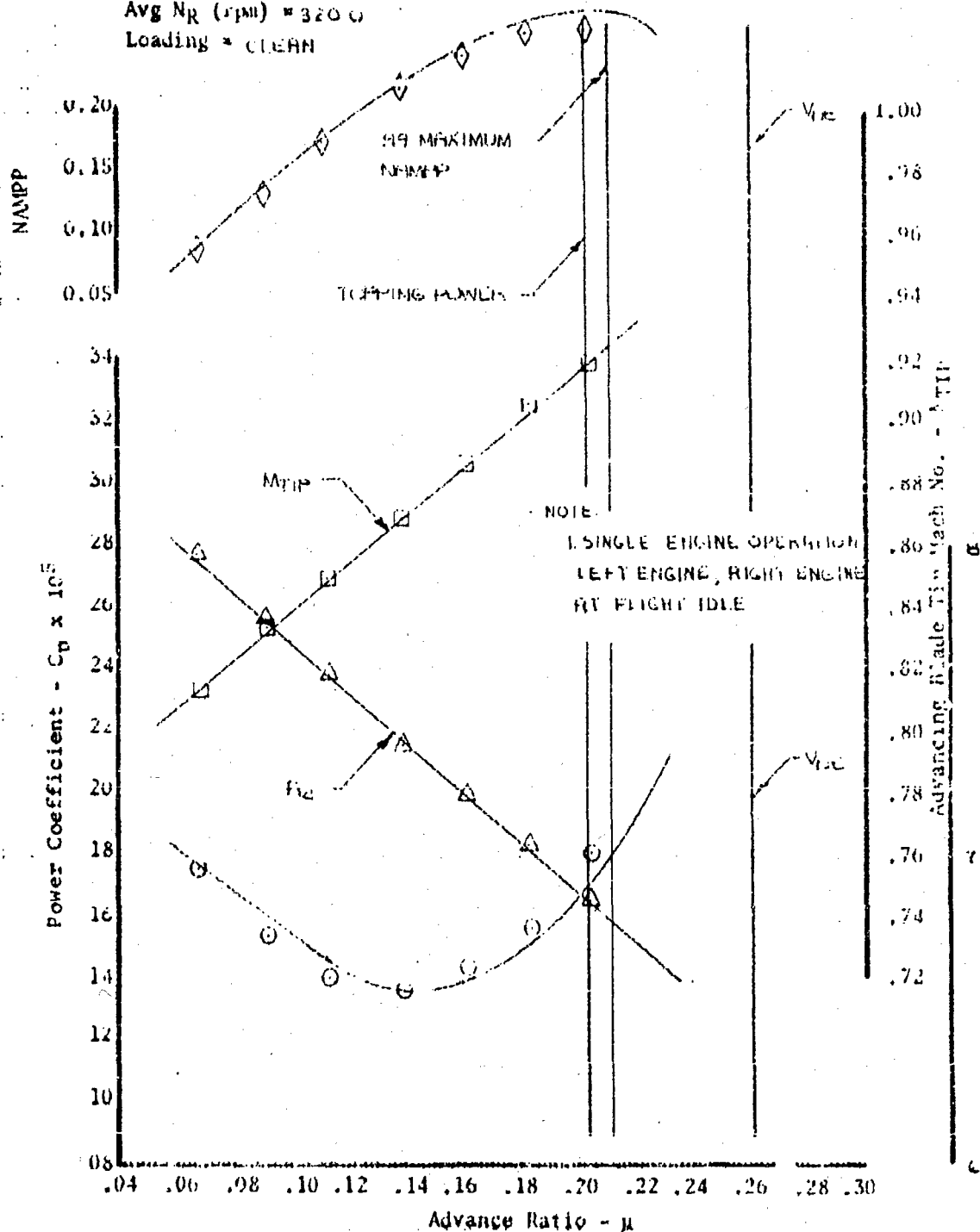


Figure 74. Nondimensional Level Flight Performance

U11-IN USAF S/N 68-10776

T400-CP-400 Engine

Category II

Condition No. = 13

$C_T = .0089917$

$W/\delta_a = 9,800$

$N_R/\sqrt{\theta_a} = 300.6$

Avg N_R (rpm) = 304.6

Loading = CLEAN

Avg Pressure Altitude (Ft) = 1660

Avg Free Air Temp. ($^{\circ}$ C) = 22.8

Avg Gross Weight (Lb) = 9,230

Avg cg Location (Sta) = 136.2

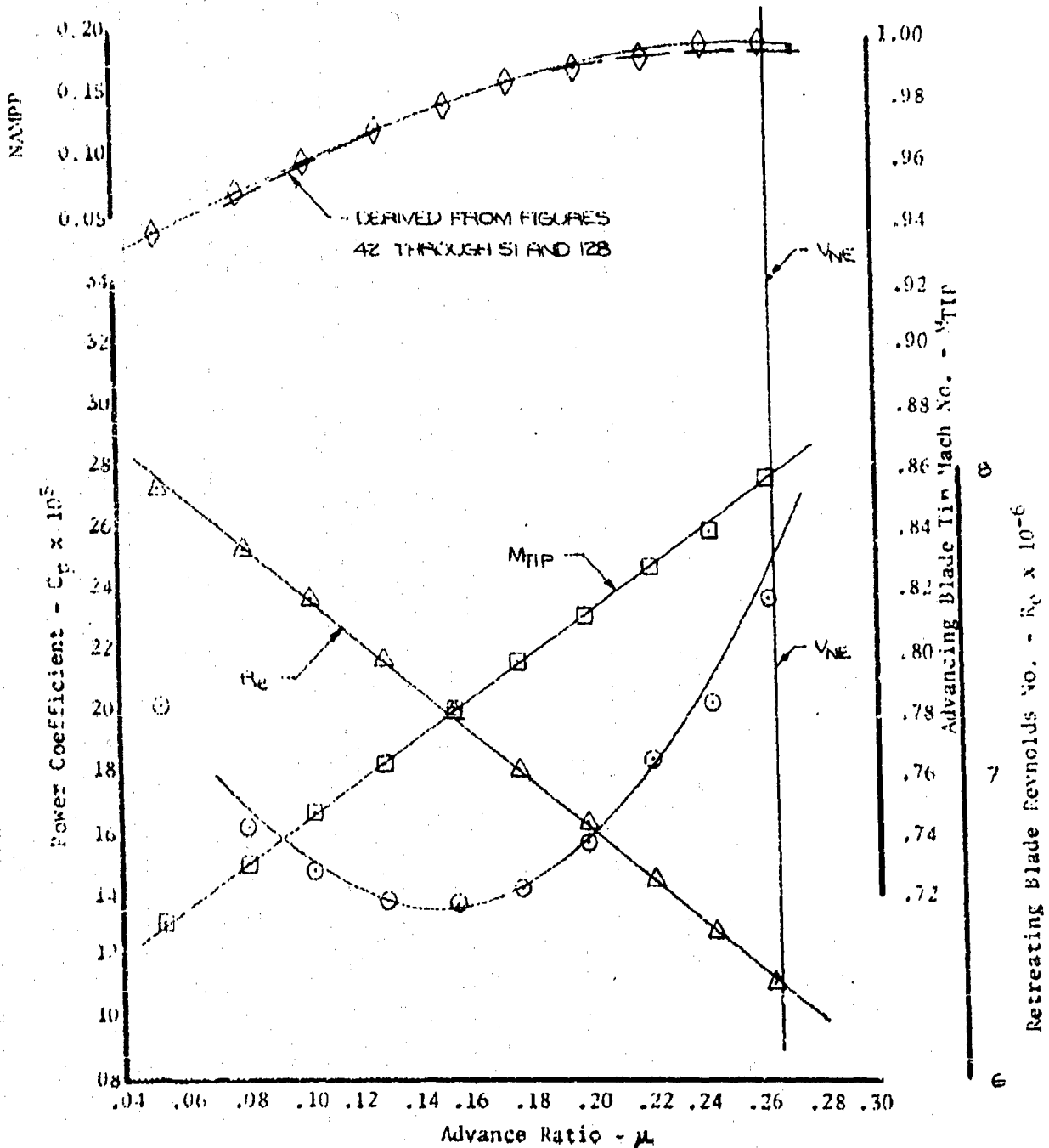


Figure 75. Nondimensional Level Flight Performance

UH-1N USAF S/N 68-10776

T400-CP-400 Engine

Category II

Condition No. = 14
 $C_T = .0040071$
 $W/\delta_a = 10,450$
 $N_R/\sqrt{\delta_a} = 309.7$
 Avg N_R (rpm) = 309.7
 Loading = CLEAN

Avg Pressure Altitude (Ft) = 4,860
 Avg Free Air Temp. ($^{\circ}\text{C}$) = 15.0
 Avg Gross Weight (lb) = 2,750
 Avg cg Location (Sta) = 136.4

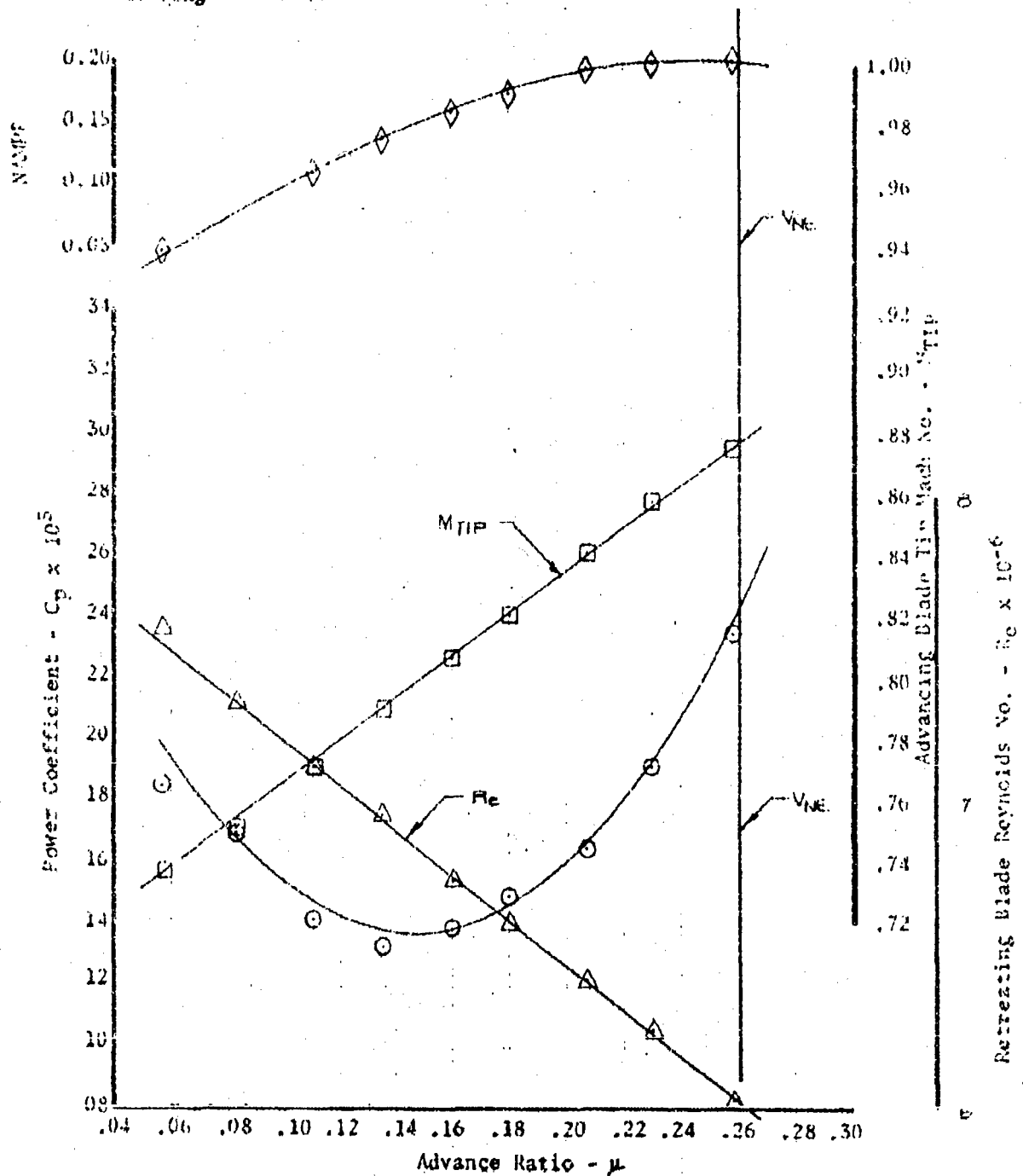


Figure 76. Nondimensional Level Flight Performance

UH-1N USAF S/N 68-10776

T400-CP-400 Engine

Category II

Condition No. = 14

$C_T = 0.0039945$

$W/\sigma_a = 10,436$

$N_R/\sqrt{\sigma_a} = 310.1$

Avg N_R (rpm) = 315.8

loading = CARGO DOORS OPEN, TWO XM-93 MINIGUNS EXTENDED
FIXED TO FIRE FORWARD, AND TWO LAU-59/A ROCKET
LAUNCHERS.

Avg Pressure Altitude (Ft) = 3,300

Avg Free Air Temp. ($^{\circ}$ C) = 25.8

Avg Gross Weight (lb) = 9,250

Avg cg Location (Sta) = 136.7

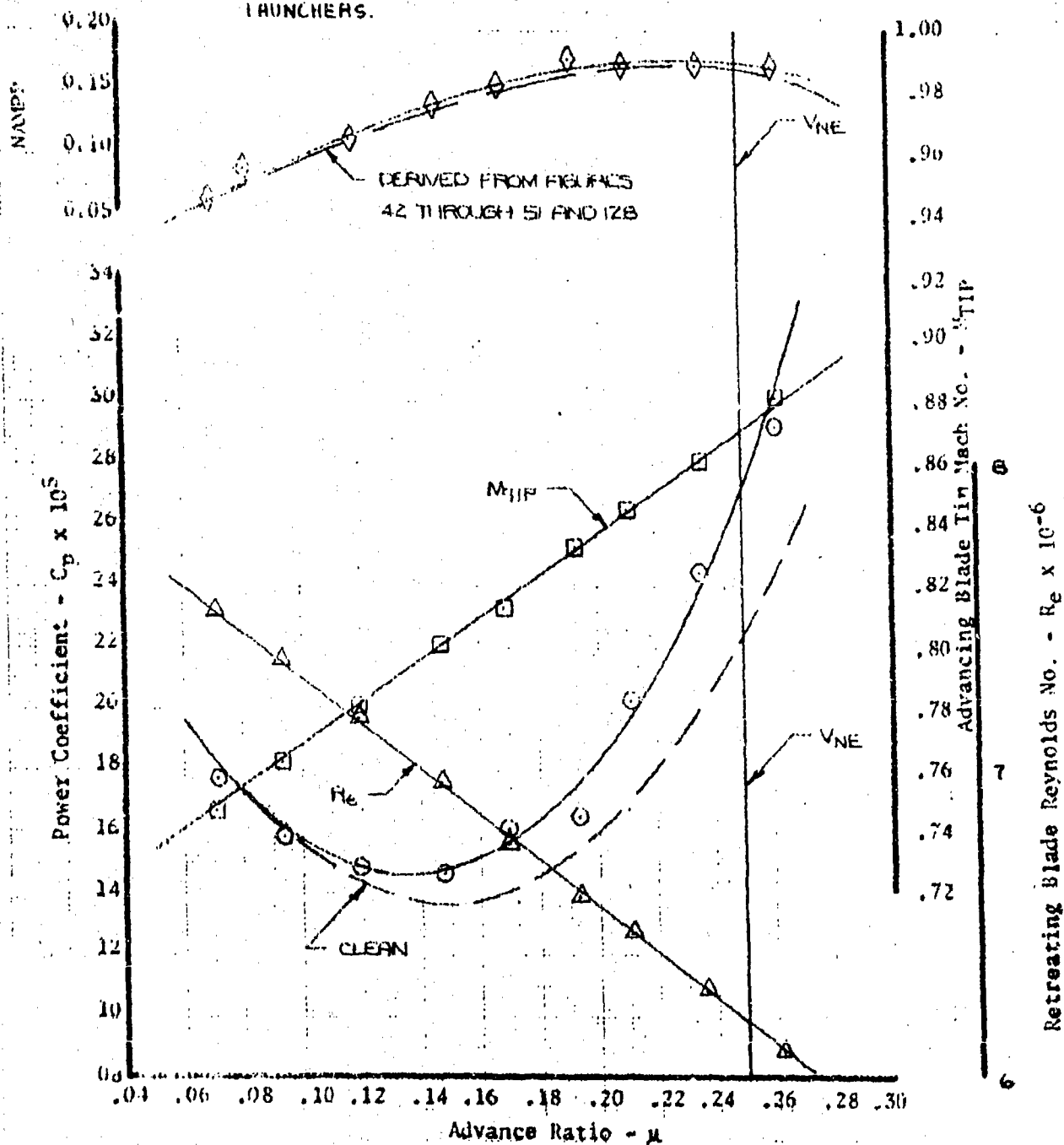


Figure 7-7. Nondimensional Level Flight Performance

DD-111 USAF S/N 68-10776

T400-CF-400 Engine

Category II

Condition No. = 15

$C_T = 0.0021025$

$W/\delta_H = 11,155$

$N_R/\sqrt{\delta_H} = 350.4$

Avg N_R (1/min) = 311.8

Loading = CLEAN

Avg Pressure Altitude (Ft) = 7,200

Avg Free Air Temp. ($^{\circ}$ C) = -0.3

Avg Gross Weight (lb) = 8510

Avg cg Location (Sta) = 135.6

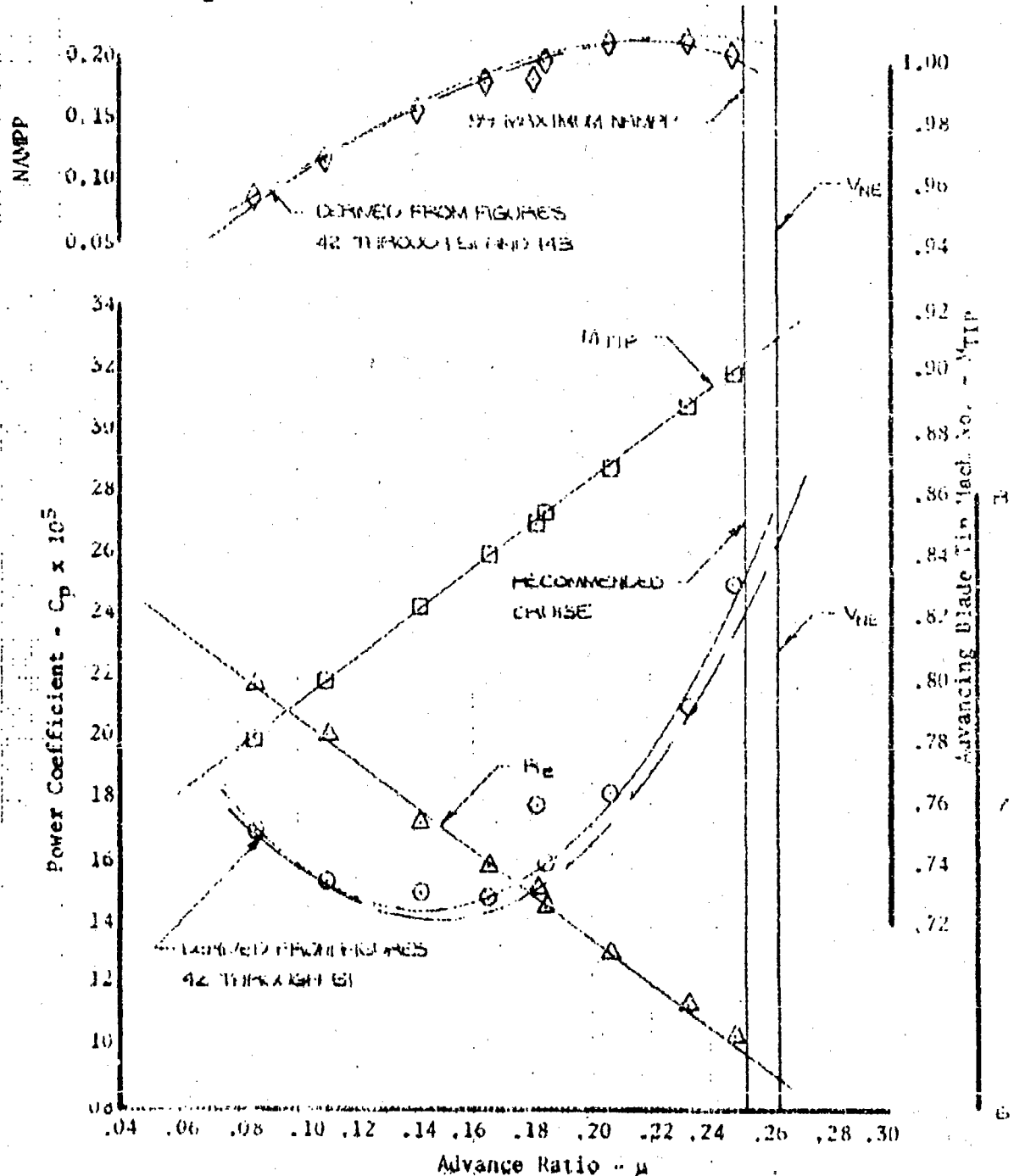


Figure 78 Nondimensional Level Flight Performance

UH-1N USAF S/N 62-10776
T400-CP-400 Engine
Category II

Condition No. = 16
 $C_T = 0.0040$
 $W/\delta_a = 11,868$
 $NR/\sqrt{\delta_a} = 330.0$
Avg NR (rpm) = 321.0
Loading = CLEAN

Avg Pressure Altitude (Ft.) = 10,260
Avg Free Air Temp. ($^{\circ}C$) = 1.9
Avg Gross Weight (Lb) = 8080
Avg cg Location (Sta) = 139.9
NOTE - TAILED SYMBOLS INDICATE BLEED
AIR ON FOR HEAT

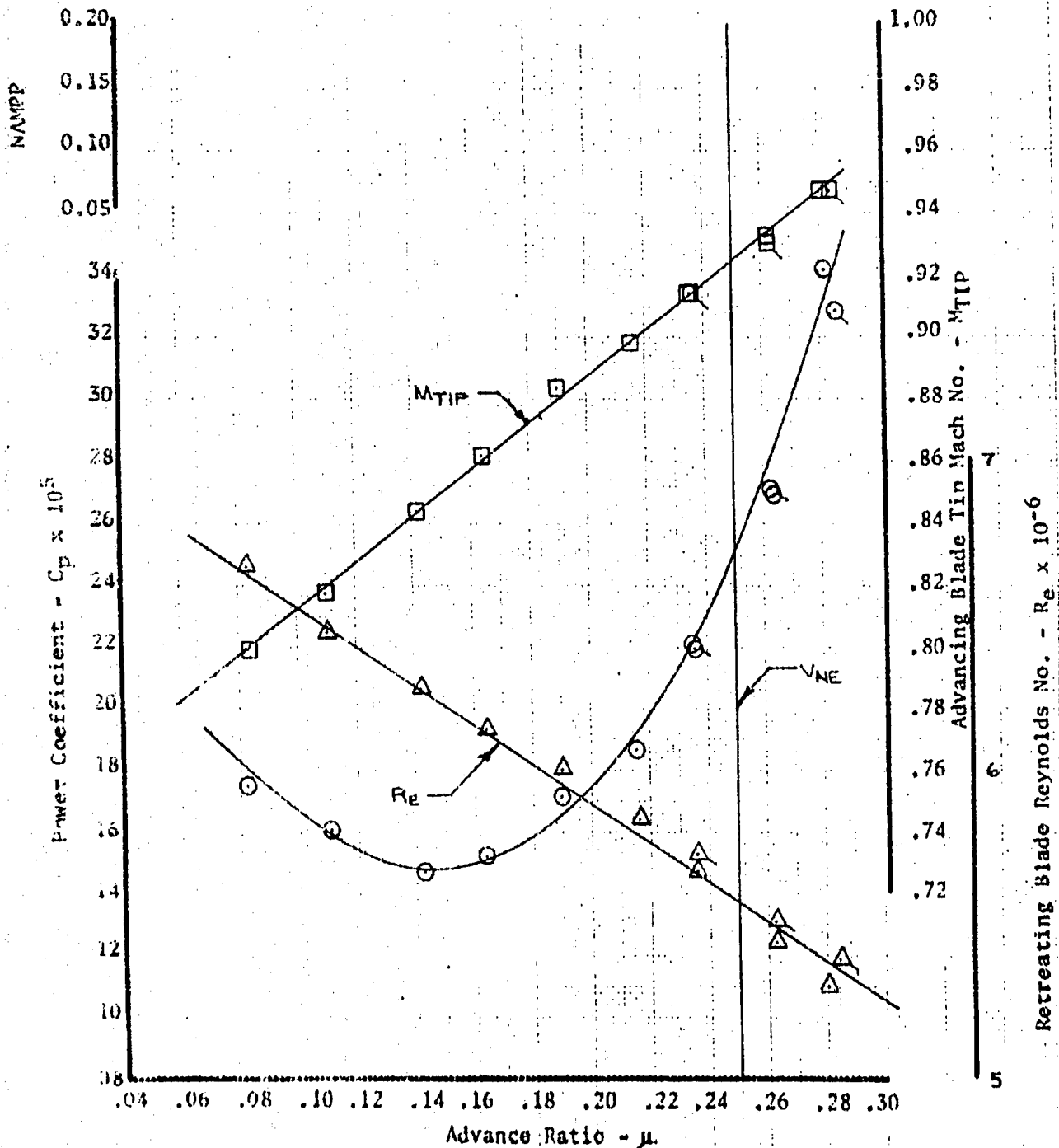


Figure 79. Nondimensional Level Flight Performance

UH-1N USAF S/N 68-10776

T400-CP-400 Engine

Category II

Condition No. = 16

$C_T = 0.0040$

$W/S_a = 11,867$

$N_R/\sqrt{\theta_a} = 330.0$

Avg N_R (rpm) = 312.8

Loading = CLEAN

Avg Pressure Altitude (Ft) = 9,150

Avg Free Air Temp. ($^{\circ}$ C) = -13.8

Avg Gross Weight (Lb) = 24,300

Avg cg Location (Sta) = 13.7

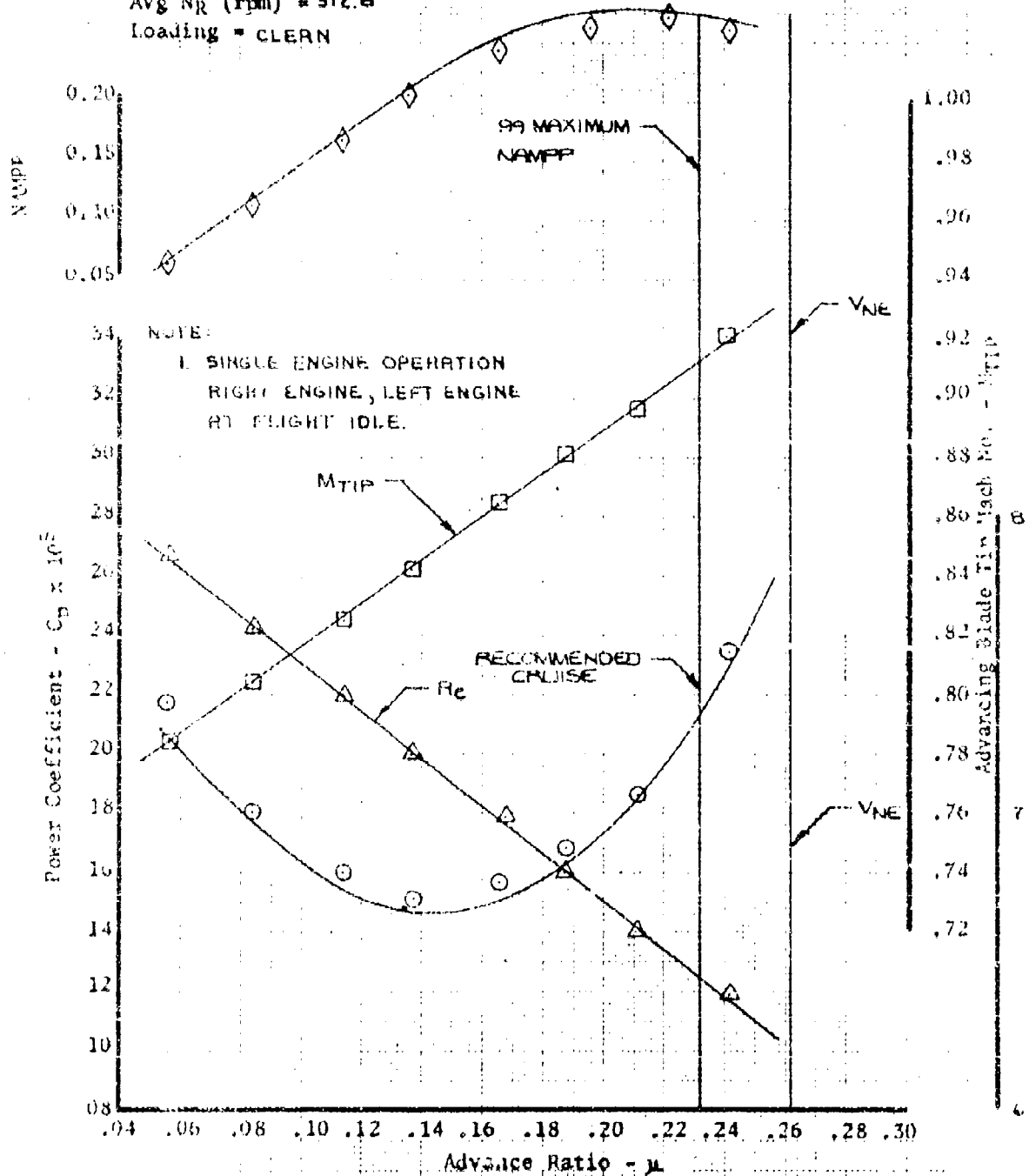


Figure 22. Nondimensional Level Flight Performance

Retreating Blade Reynolds No. - $Re \times 10^{-6}$

U11-1N USAF S/N 68-10776
T400-CP-400 Engine
Category II

Condition No. = 17
 $C_T = 0.004025$
 $W/\delta_a = 12602$
 $N_R/\sqrt{\delta_a} = 339.3$
Avg N_R (rpm) = 315.6
Loading = CLEAN

Avg Pressure Altitude (Ft) = 6620
Avg Free Air Temp. ($^{\circ}$ C) = -23.9
Avg Gross Weight (Lb) = 9,870
Avg cg Location (Sta) = 137.4
NOTE - TAILED SYMBOLS INDICATE BLEED
AIR ON FOR HEAT

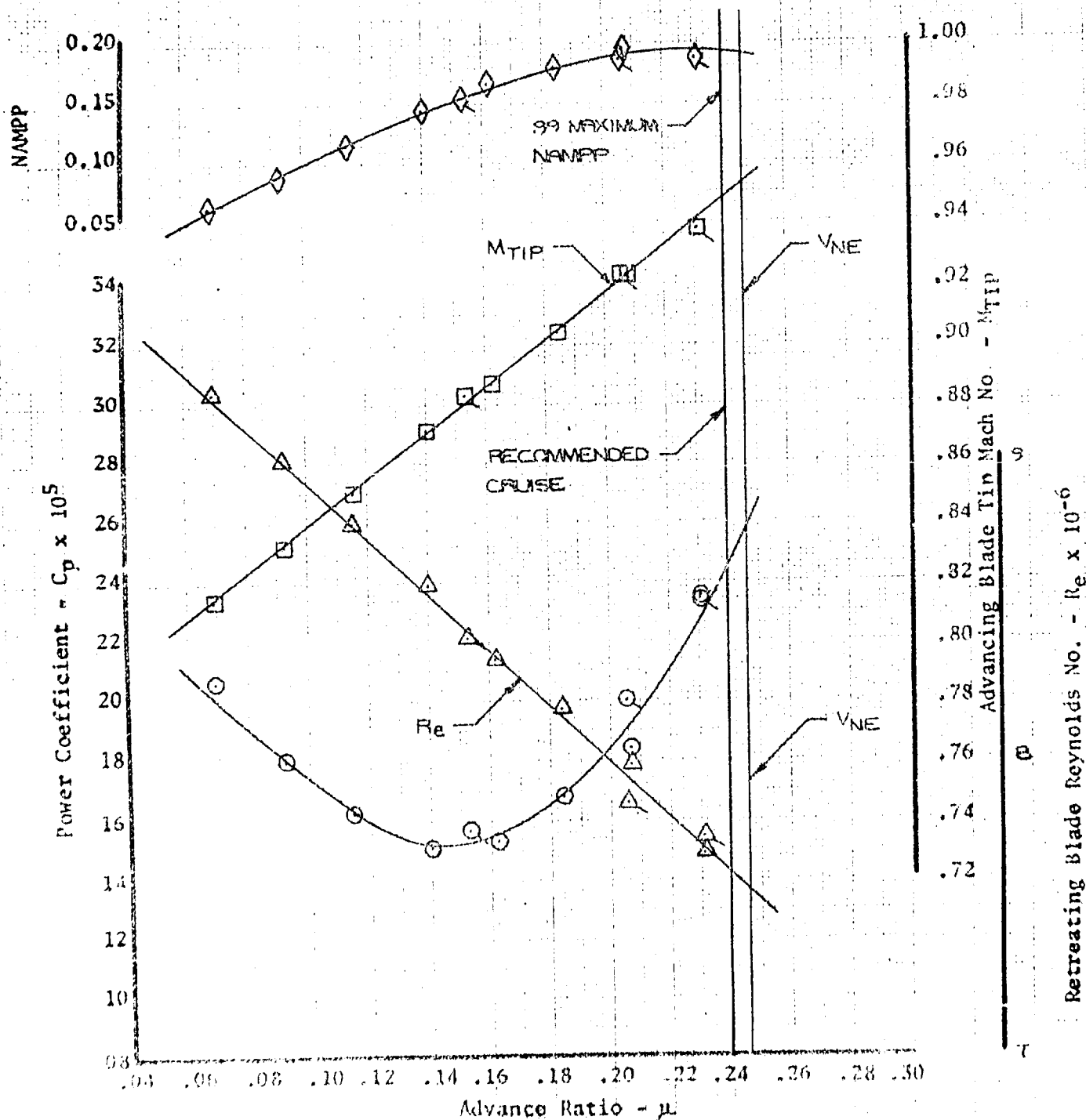


Figure B1. Nondimensional Level Flight Performance

UH-1N USAF S/N 68-10776

T400-CP-400 Engine

Category II

Condition No. = 19

$C_T = 00429577$

$W/\delta_a = 10,554$

$N_R/\sqrt{\delta_a} = 300.7$

Avg N_R (rpm) = 305.2

Loading = CLEAN

Avg Pressure Altitude (Ft) = 1,760

Avg Free Air Temp. ($^{\circ}$ C) = 23.7

Avg Gross Weight (lb) = 9,900

Avg cg Location (Sta) = 137.9

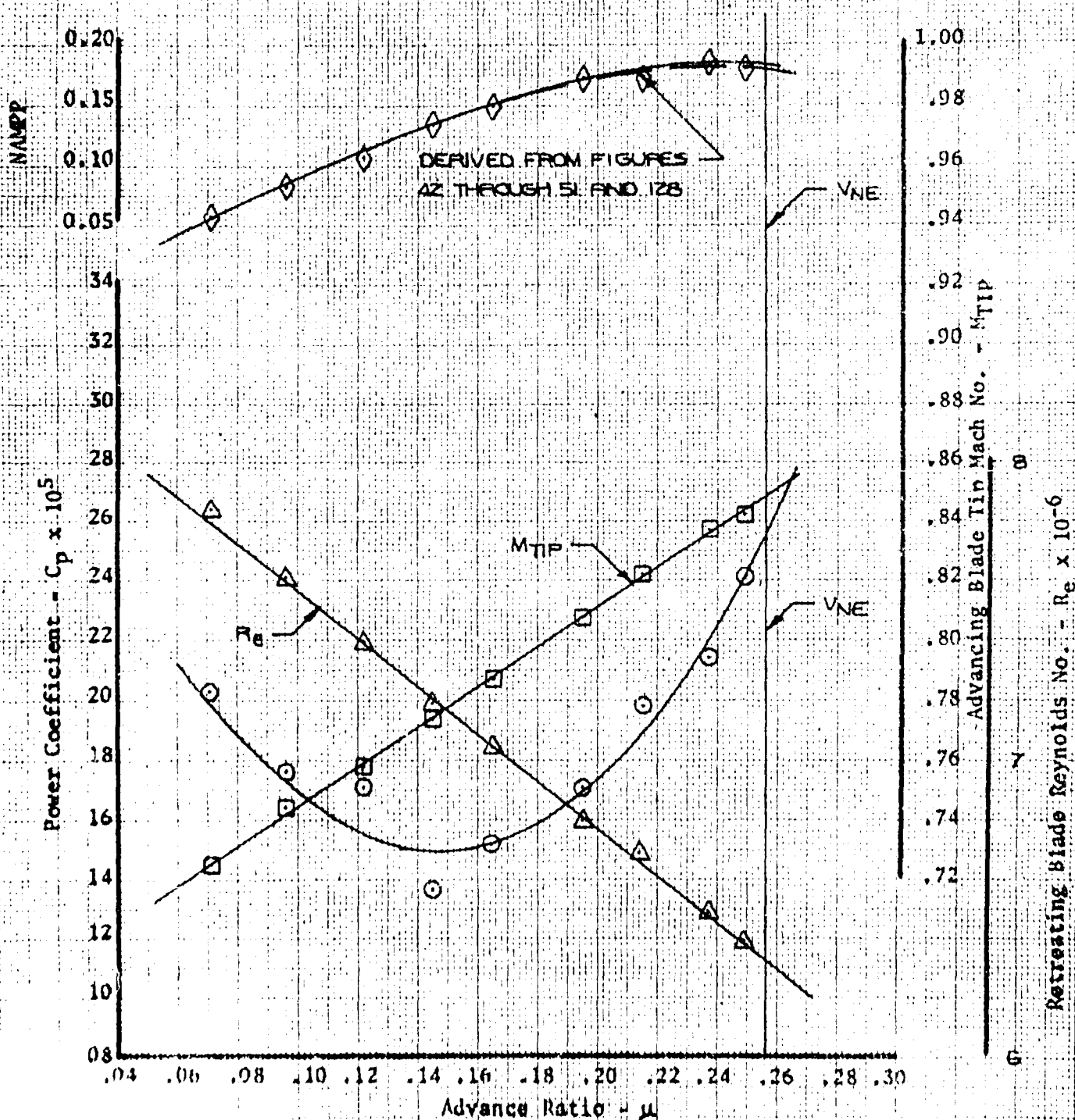


Figure 2. Nondimensional Level Flight Performance

U1-1N USAF S/N 68-10776

T400-CP-400 Engine

Category II

Condition No. = 17

$C_T = 0.004025$

$W/\delta_a = 12602$

$N_R/\sqrt{\delta_a} = 339.3$

Avg N_R (rpm) = 315.6

Loading = CLEAN

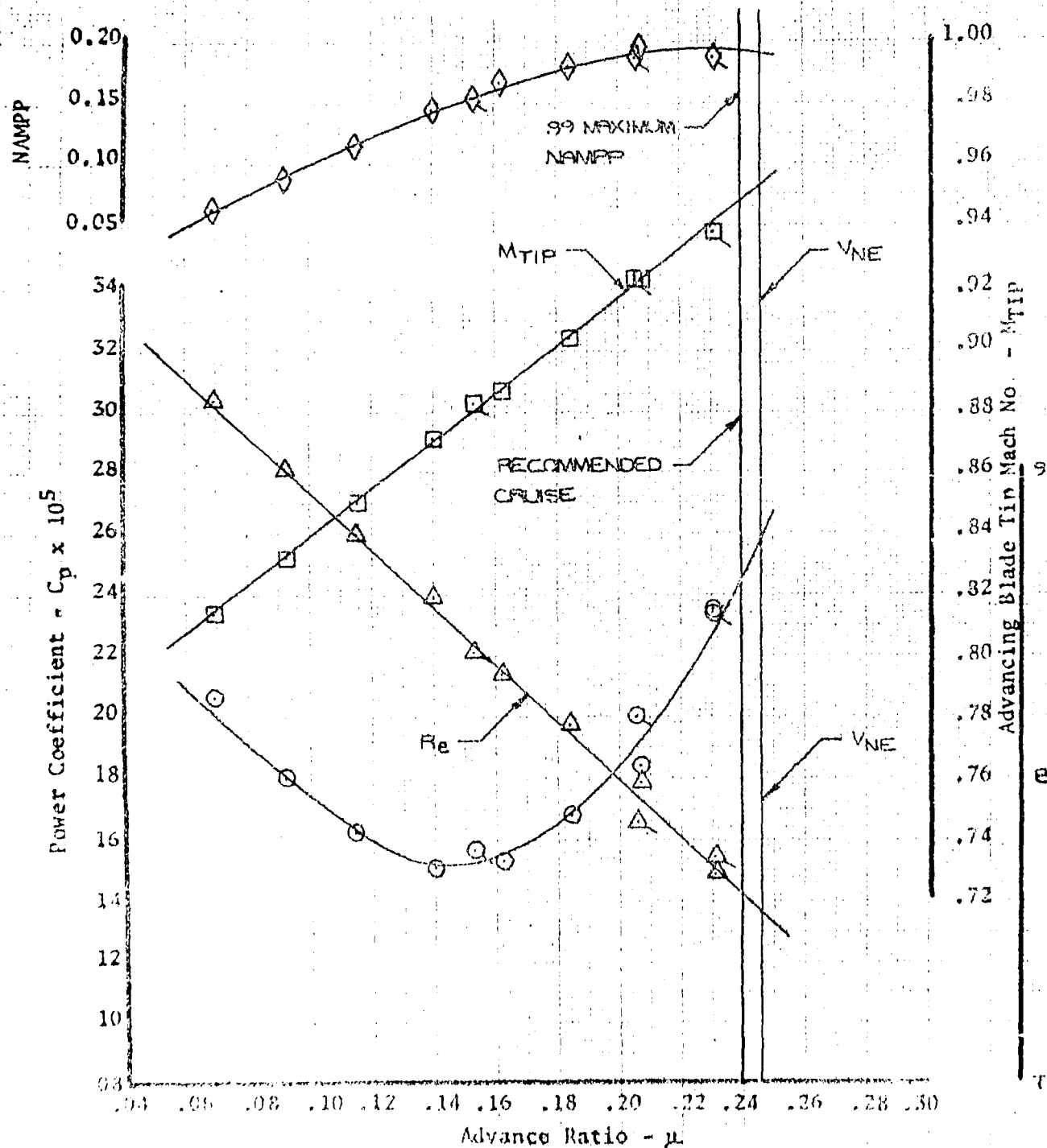
Avg Pressure Altitude (Ft) = 6620

Avg Free Air Temp. ($^{\circ}$ C) = -23.9

Avg Gross Weight (Lb) = 9370

Avg cg Location (Sta) = 137.4

NOTE - TAILED SYMBOLS INDICATE BLEED
AIR ON FOR HEAT



Retreating Blade Reynolds No. - $Re \times 10^{-6}$

U11-1N USAF S/N 68-10776

T400-CP-400 Engine

Category II

Condition No. = 20

$C_T = 0.0042795$

$W/\delta_a = 11,224$

$N_R/\sqrt{\theta_a} = 310.7$

Avg N_R (rpm) = 312.5

Loading = CLEAN

Avg Pressure Altitude (Ft) = 5450

Avg Free Air Temp. ($^{\circ}\text{C}$) = 18.3

Avg Gross Weight (Lb) = 9,180

Avg cg Location (Sta) = 136.3

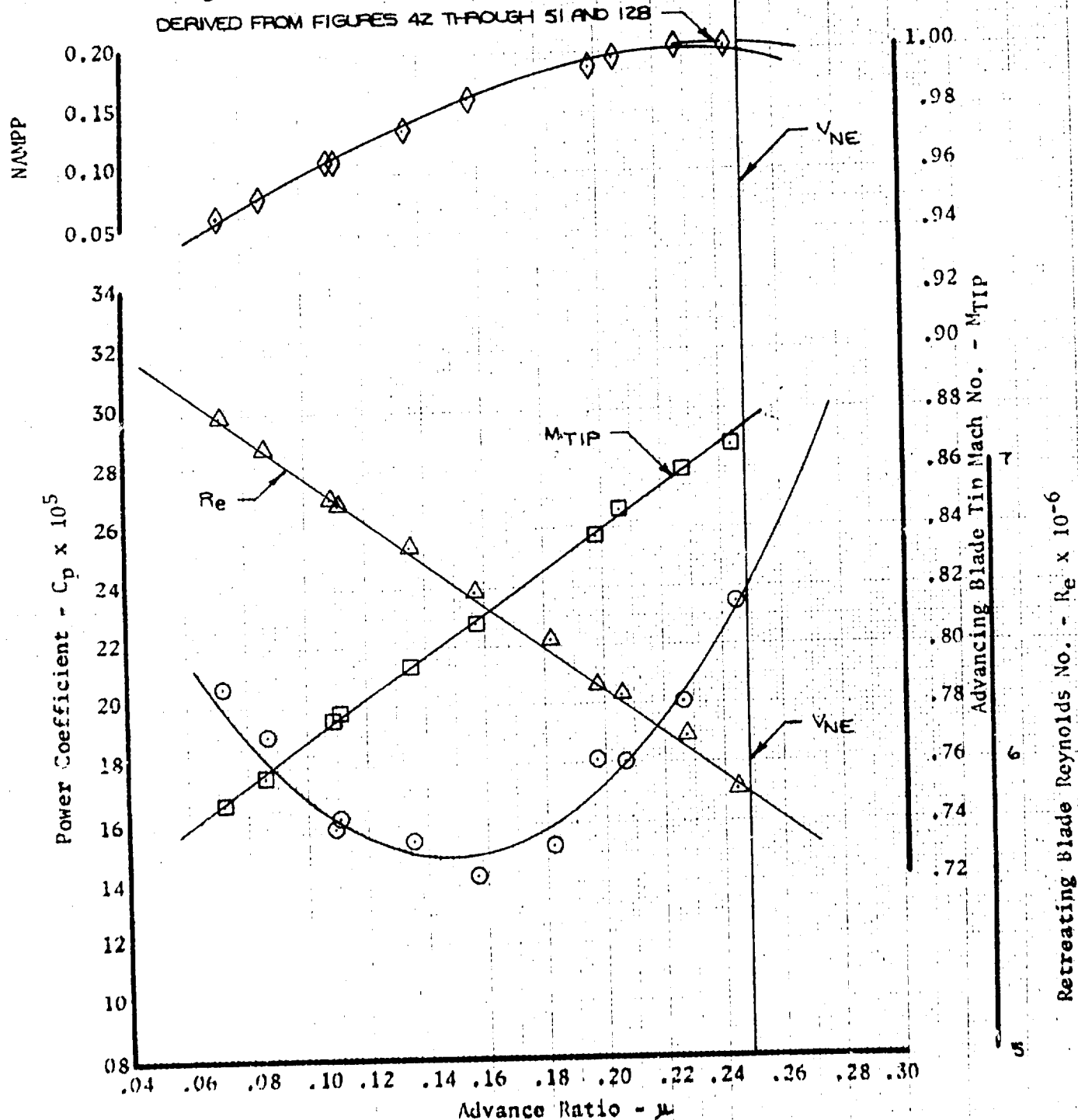


Figure 83. Nondimensional Level Flight Performance

UH-1N USAF S/N 68-10776
T400-CP-400 Engine
Category II

Condition No. = 20
 $C_T = 0.0043184$
 $W/\delta_a = 11,251$
 $N_R/\sqrt{\delta_a} = 309.5$
Avg N_R (rpm) = 310.5
Loading = TWO LAU-59/A ROCKET LAUNCHERS

Avg Pressure Altitude (Ft) = 6950
Avg Free Air Temp. ($^{\circ}\text{C}$) = 16.8
Avg Gross Weight (Lb) = 8700
Avg cg Location (Sta) = 136.9

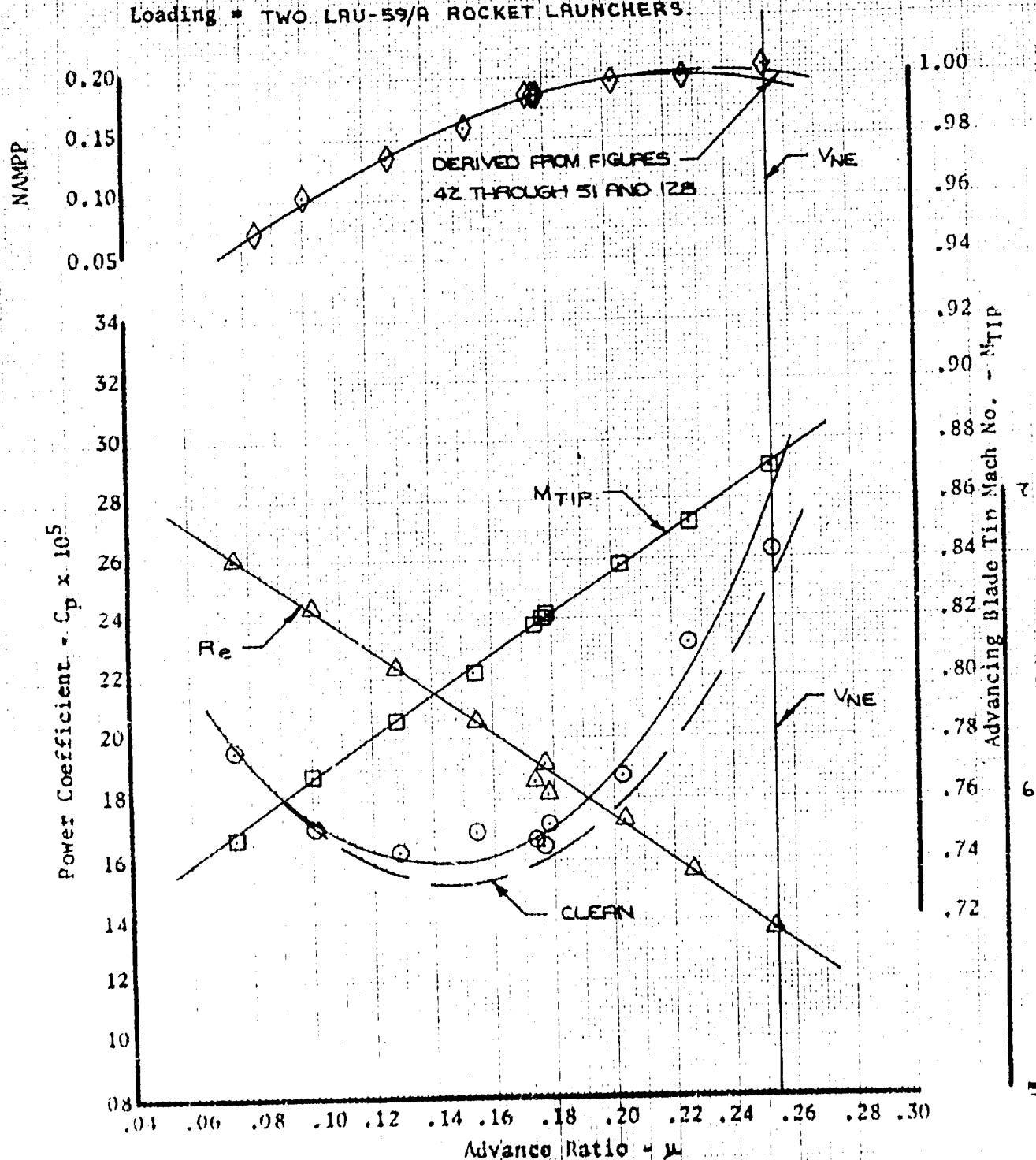


Figure 84. Nondimensional Level Flight Performance

UH-1N USAF S/N 68-10776
T400-CP-400 Engine
Category II

Condition No. = 20

$C_T = 0.0042998$

$W/\delta_a = 11,248$

$N_R/\sqrt{\delta_a} = 310.3$

Avg N_R (rpm) = 215.5

Loading = CARGO DOORS OPEN, TWO XM-53 MINIGUNS EXTENDED
FIXED TO FIRE FORWARD, AND TWO LAU-59/A ROCKET
LAUNCHERS

Avg Pressure Altitude (Ft) = 4130

Avg Free Air Temp. ($^{\circ}\text{C}$) = 24.8

Avg Gross Weight (lb) = 9480

Avg cg Location (Sta) = 137.2

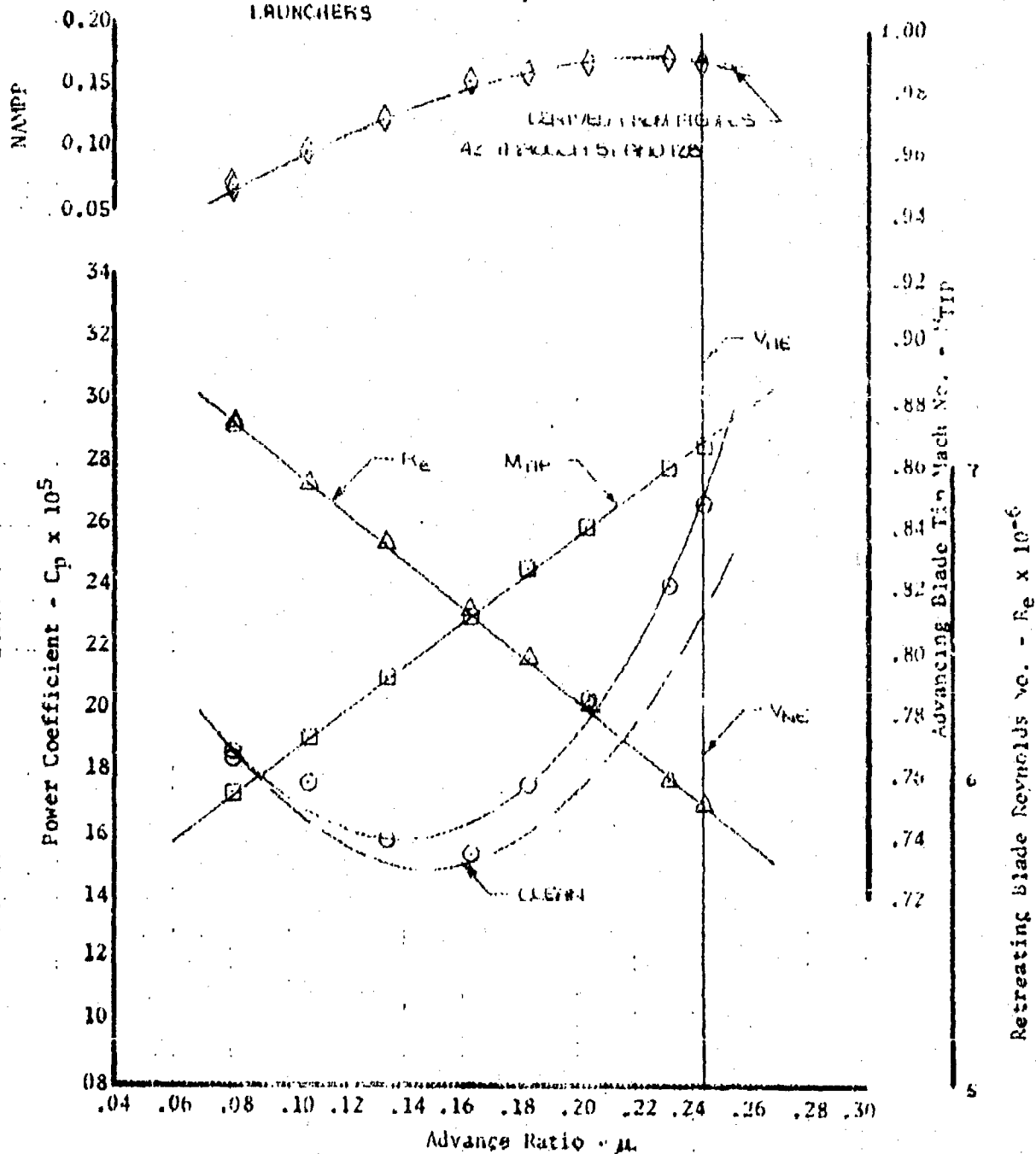


Figure 65. Nondimensional Level Flight Performance.

UH-1N USAF S/N 68-10776
T400-CP-400 Engine
Category II

Condition No. = 21
 $C_T = 0.0042857$
 $W/\delta_a = 11,959$
 $N_R/\sqrt{\delta_a} = 820.5$
 Avg N_R (rpm) = 316.0
 Loading = CLEAN

Avg Pressure Altitude (Ft) = 7,890
 Avg Free Air Temp. ($^{\circ}\text{C}$) = 7.1
 Avg Gross Weight (Lb) = 8,920
 Avg cg Location (Sta) = 137.4

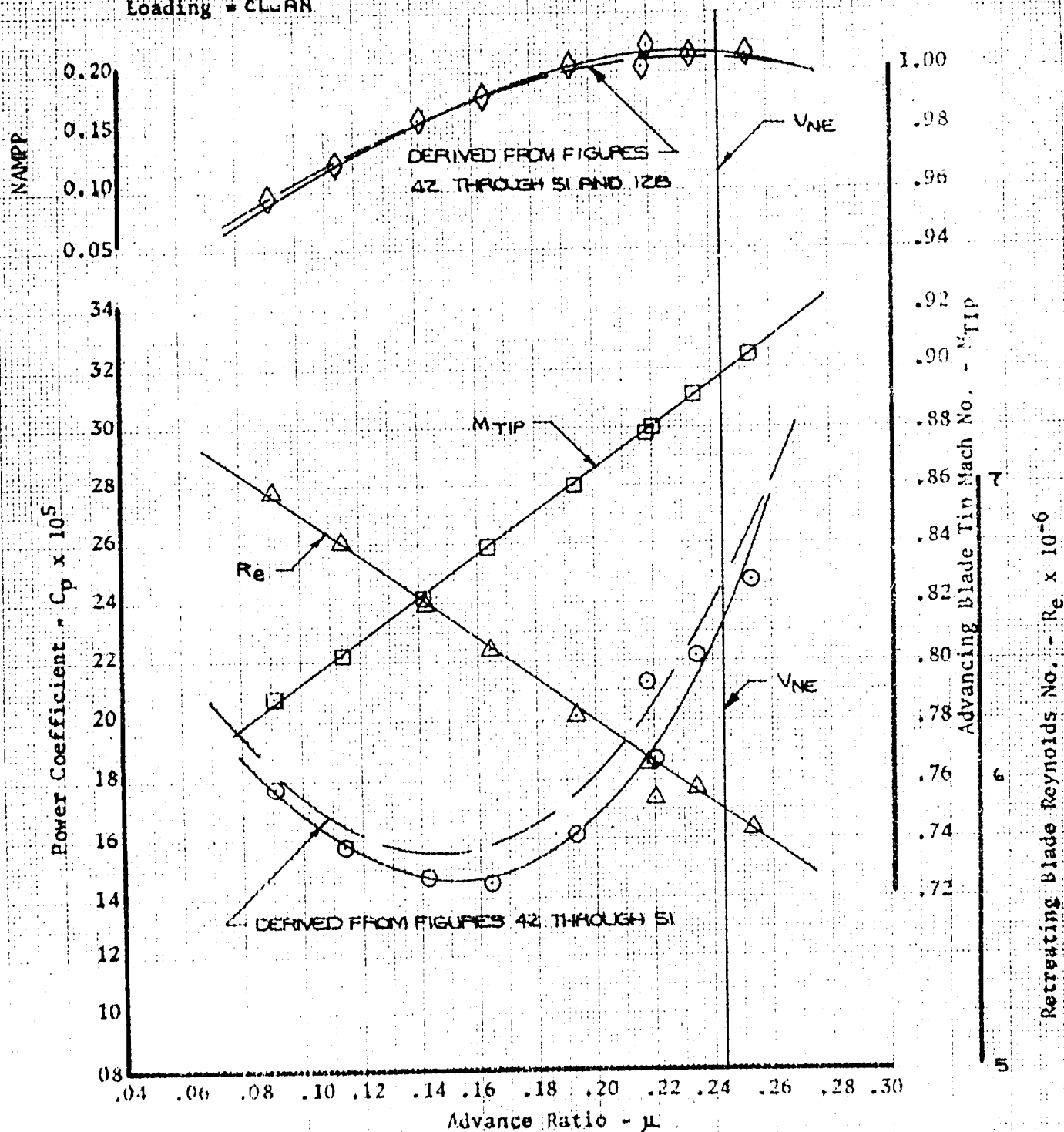


Figure 86. Nondimensional Level Flight Performance

U11-IN USAF S/N 68-10776
T400-CP-400 Engine
Category II

Condition No. = 22
 $C_T = 0.004259$
 $W/\delta_a = 12,774$
 $N_R/\sqrt{\sigma_a} = 332.2$
Avg N_R (rpm) = 321.9
Loading = CLEAN

Avg Pressure Altitude (Ft) = 1580
Avg Free Air Temp. ($^{\circ}$ C) = -2.7
Avg Gross Weight (Lb) = 8930
Avg cg Location (Sta) = 137.2

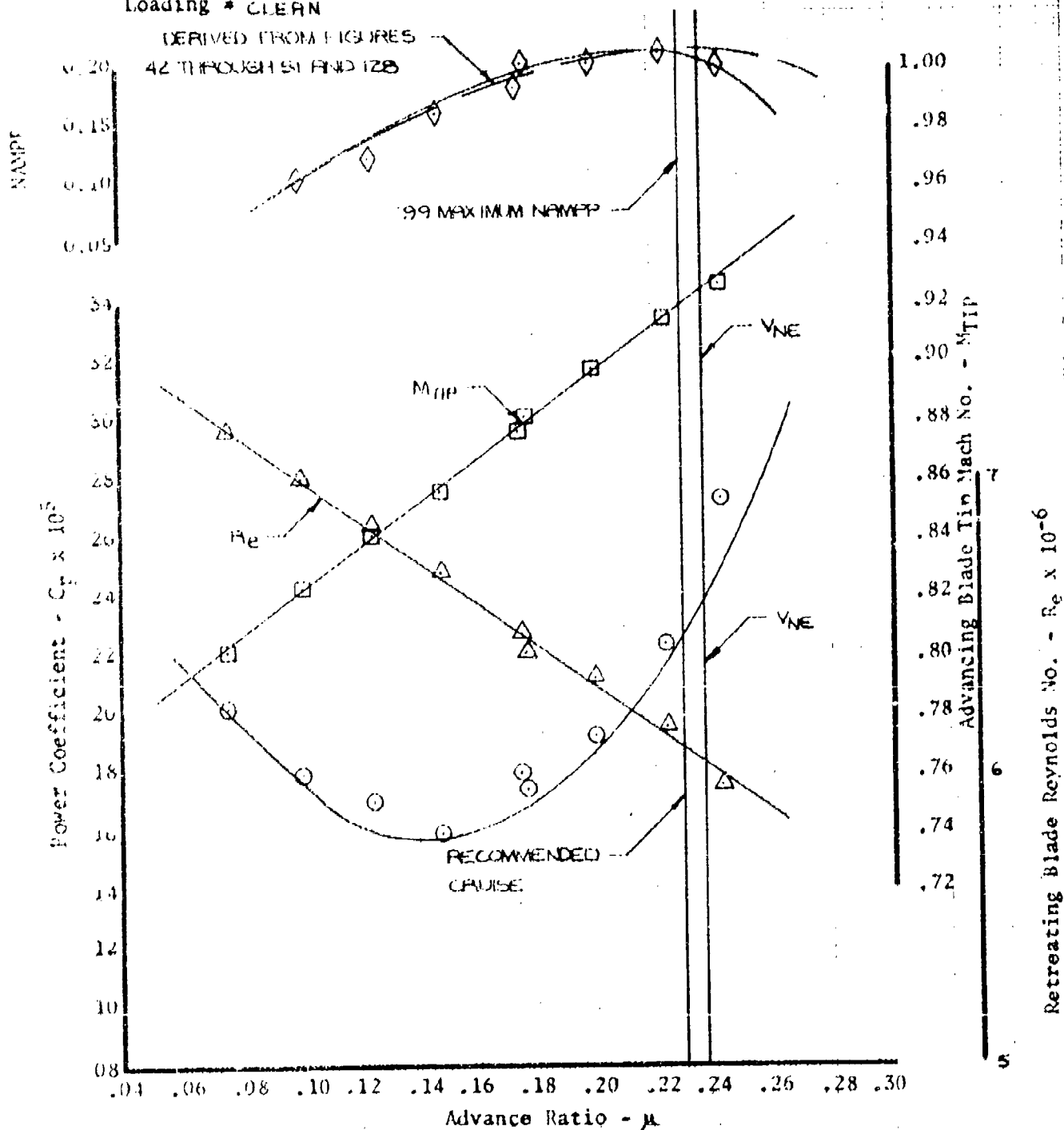


Figure 87. Nondimensional Level Flight Performance

UH-1N USAF S/N 68-10776
T400-CP-400 Engine
Category II

Condition No. = 22
 $C_T = 0.0042853$
 $W/\delta_a = 12,946$
 $N_R/\sqrt{\delta_a} = 331.3$
 Avg N_R (rpm) = 320.7
 Loading = CLEEN

Avg Pressure Altitude (Ft) = 10,860
 Avg Free Air Temp. ($^{\circ}\text{C}$) = -3.3
 Avg Gross Weight (Lb) = 8,610
 Avg cg Location (Sta) = 138.0

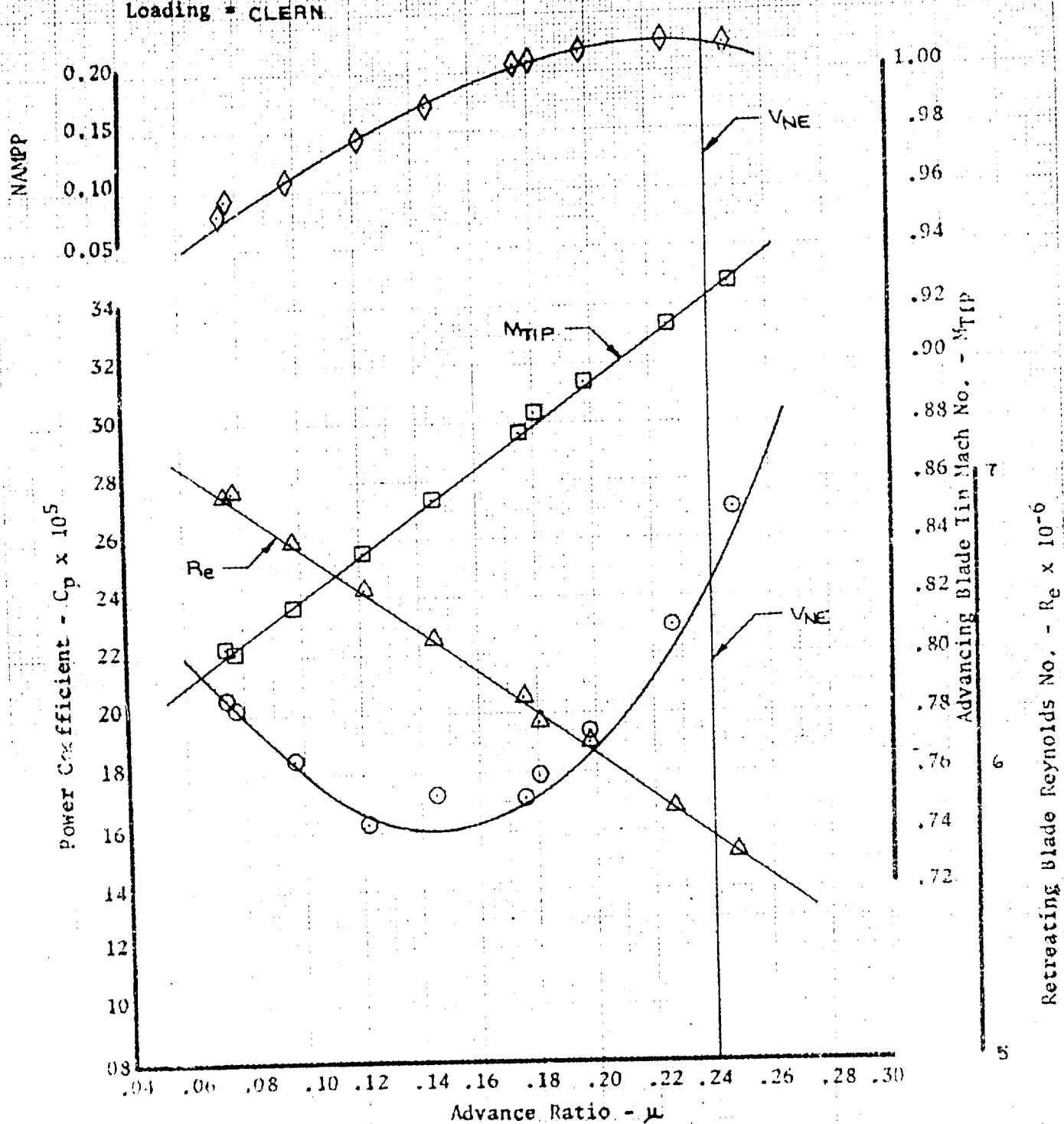


Figure 88. Nondimensional Level Flight Performance

J11-1N USAF S/N 68-10776
T400-CP-400 Engine
Category II

Condition No. = 25
 $C_T = 0.004336$
 $W/\delta_a = 13591$
 $NR/\sqrt{\delta_a} = 339.6$
Avg N_R (rpm) = 313.8
Loading = CLEAN

Avg Pressure Altitude (Ft) = 9320
Avg Free Air Temp. ($^{\circ}$ C) = -27.1
Avg Gross Weight (Lb) = 9590
Avg cg Location (Sta) = 126.3

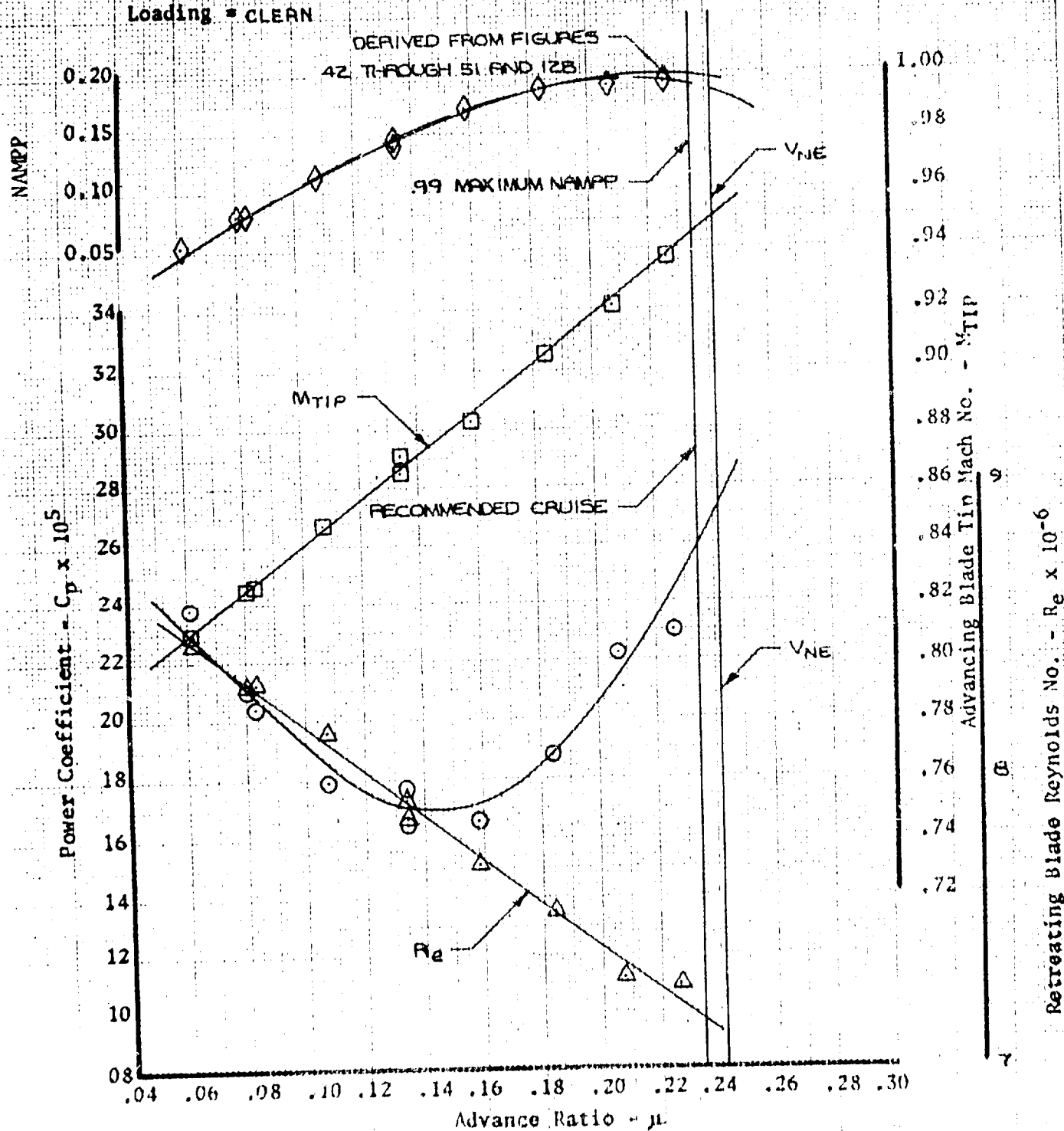


Figure 89. Nondimensional Level Flight Performance

UHL-1N USAF S/N 68-10776
T400-CP-400 Engine
Category II

Condition No. = 25
C_T = .0045855
W/δ_a = 11,273
N_R/√δ_a = 300.8
Avg N_R (rpm) = 301.5
Loading = CLEAN

Avg Pressure Altitude (Ft) = 3,780
Avg Free Air Temp. (°C) = 16.4
Avg Gross Weight (lb) = 9,820
Avg cg Location (Sta) = 128.3

DERIVED FROM FIGURES 42 THROUGH 51 AND 128

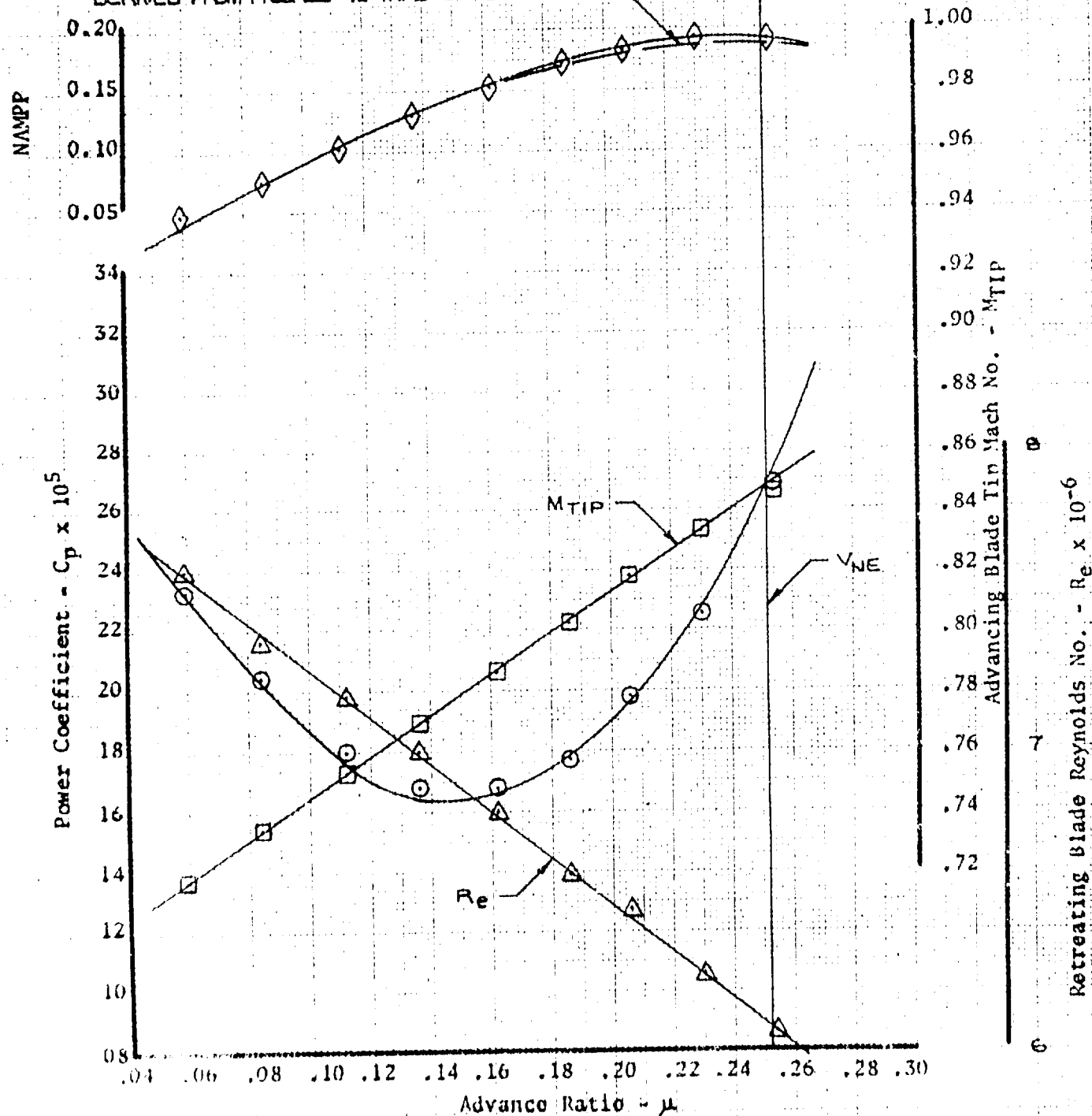


Figure 90. Nondimensional Level Flight Performance

UH-1N USAF S/N 68-10776
T400-CP-400 Engine
Category II

Condition No. = 26

$C_T = 0.0046099$

$W/\delta_a = 12,022$

$N_R/\sqrt{\sigma_a} = 309.7$

Avg N_R (rpm) = 310.3

Loading = TWO LAU-59/A ROCKET LAUNCHERS.

Avg Pressure Altitude (Ft) = 7,700

Avg Free Air Temp. ($^{\circ}$ C) = 16.1

Avg Gross Weight (Lb) = 9030

Avg cg Location (Sta) = 1380

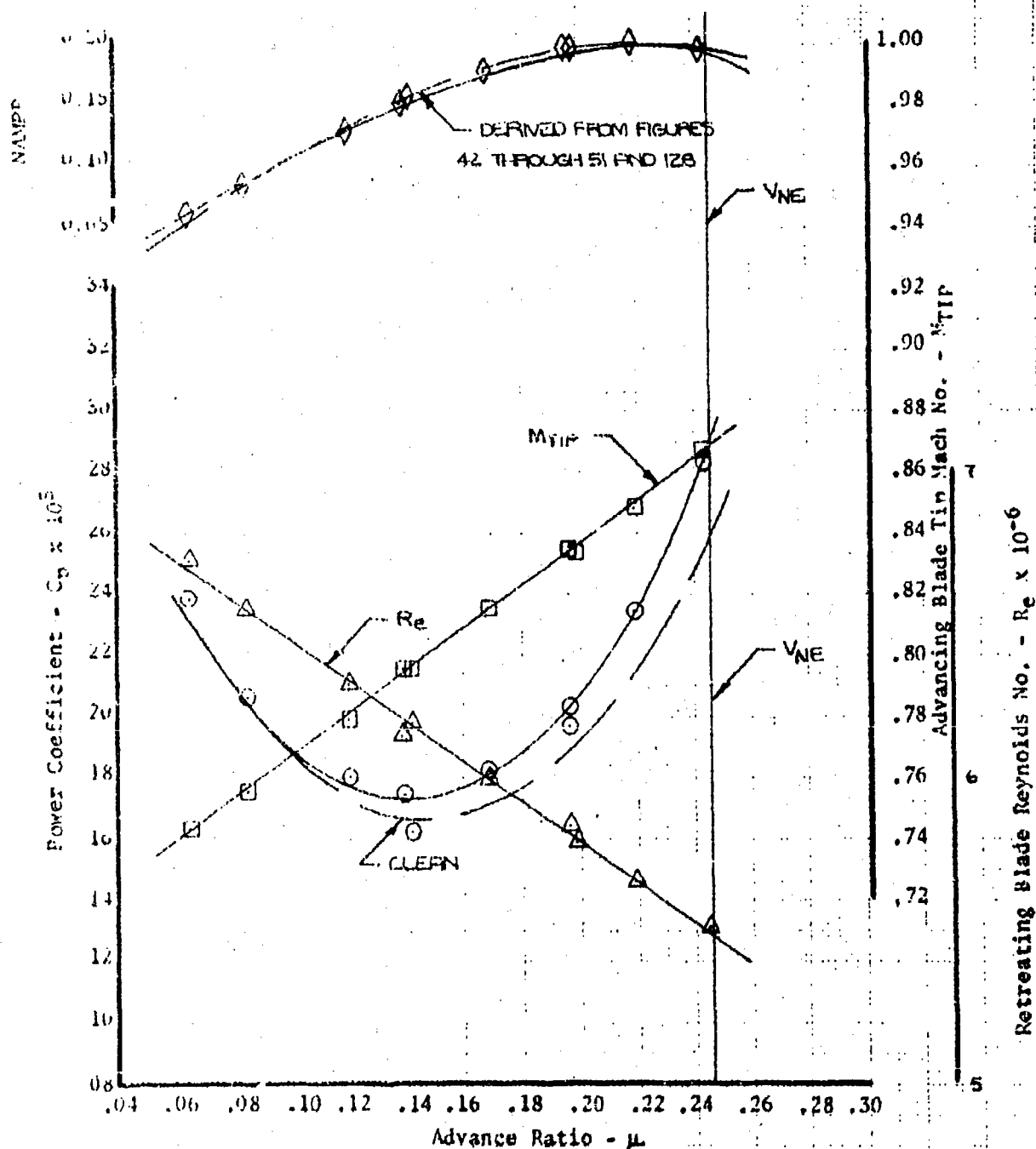


Figure 91. Nondimensional Level Flight Performance.

UH-1N USAF S/N 68-10776
T400-CP-400 Engine
Category II

Condition No. = 26

$C_T = 0.004547$

$W/\delta_a = 11951$

$N_R/\sqrt{\sigma_a} = 310.9$

Avg N_R (rpm) = 309.7

Avg Pressure Altitude (Ft) = 6,200

Avg Free Air Temp. ($^{\circ}$ C) = 12.9

Avg Gross Weight (lb) = 9,430

Avg cg Location (Sta) = 137.8

loading = CARGO DOORS OPEN, TWO XM-93 MINIGUNS EXTENDED
FIXED TO FIRE FORWARD, AND TWO LAU-59/A ROCKET
LAUNCHERS.

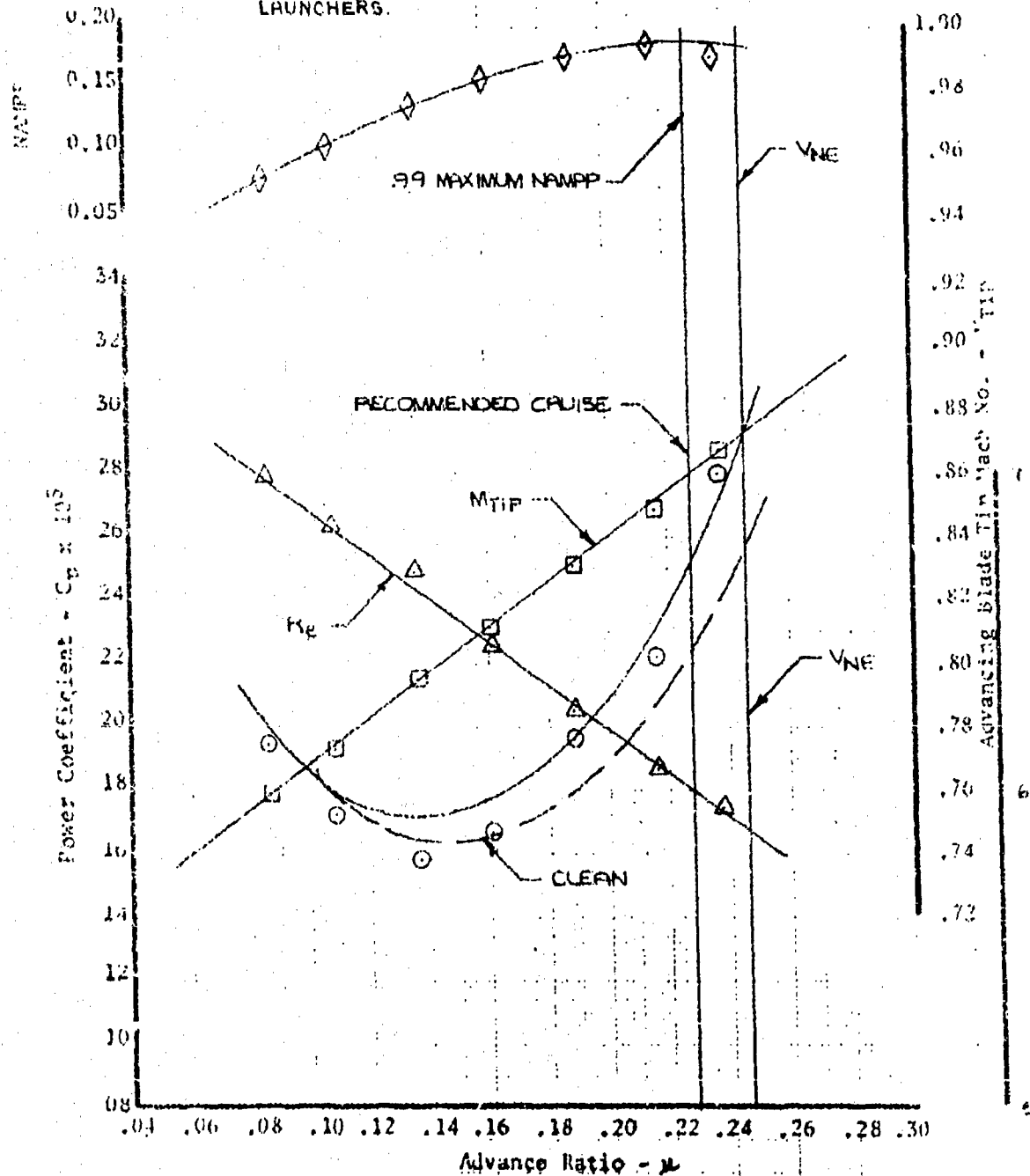


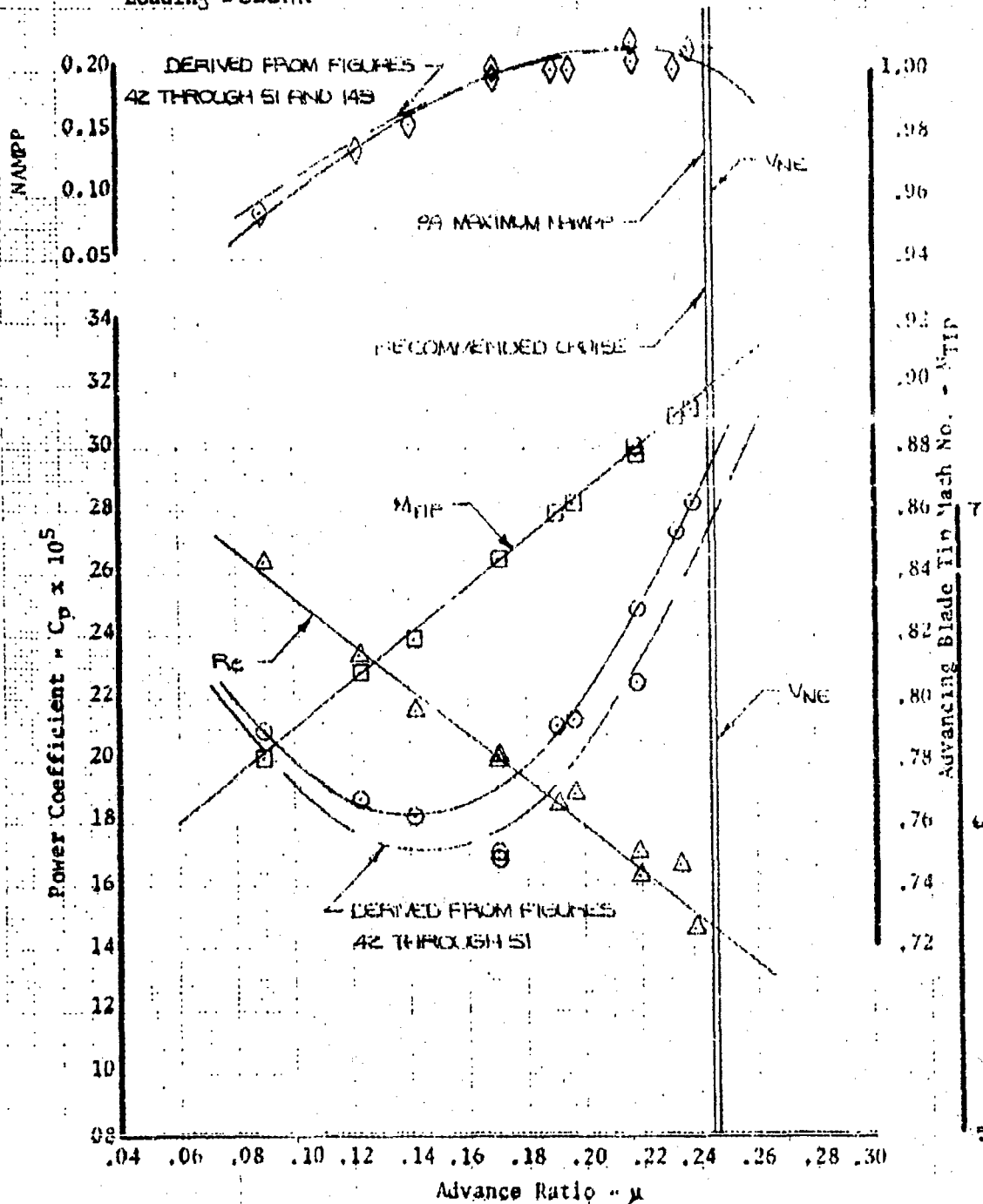
Figure 92. Nondimensional Level Flight Performance

Retreating Blade Reynolds No. = $Re \times 10^{-6}$

III-IN USAF S/N 68-10776
T400-CP-400 Engine
Category II

Condition No. = 27
 $C_T = 0.0045857$
 $W/\delta_a = 12,808$
 $N_R/\sqrt{\theta_f} = 320.5$
Avg N_R (rpm) = 310.7
Loading = CLEAN

Avg Pressure Altitude (Ft) = 9,790
Avg Free Air Temp. ($^{\circ}\text{C}$) = -2.4
Avg Gross Weight (lb) = 8,880
Avg cg location (Sta) = 137.0



U-11 IN USAF S/N 68-10776

T400-CP-400 Engine

Category II

Condition No. = 29

$C_T = 0.004646$

$W/\delta_a = 14473$

$N_R/\sqrt{\theta_a} = 338.6$

Avg N_R (rpm) = 311.2

Loading = CLEAN

Avg Pressure Altitude (Ft) = 14,340

Avg Free Air Temp. ($^{\circ}\text{C}$) = -29.7

Avg Gross Weight (Lb) = 8,390

Avg cg Location (Sta) = 138.3

NOTE - TAILED SYMBOLS INDICATE BLEED
AIR ON FOR HEAT

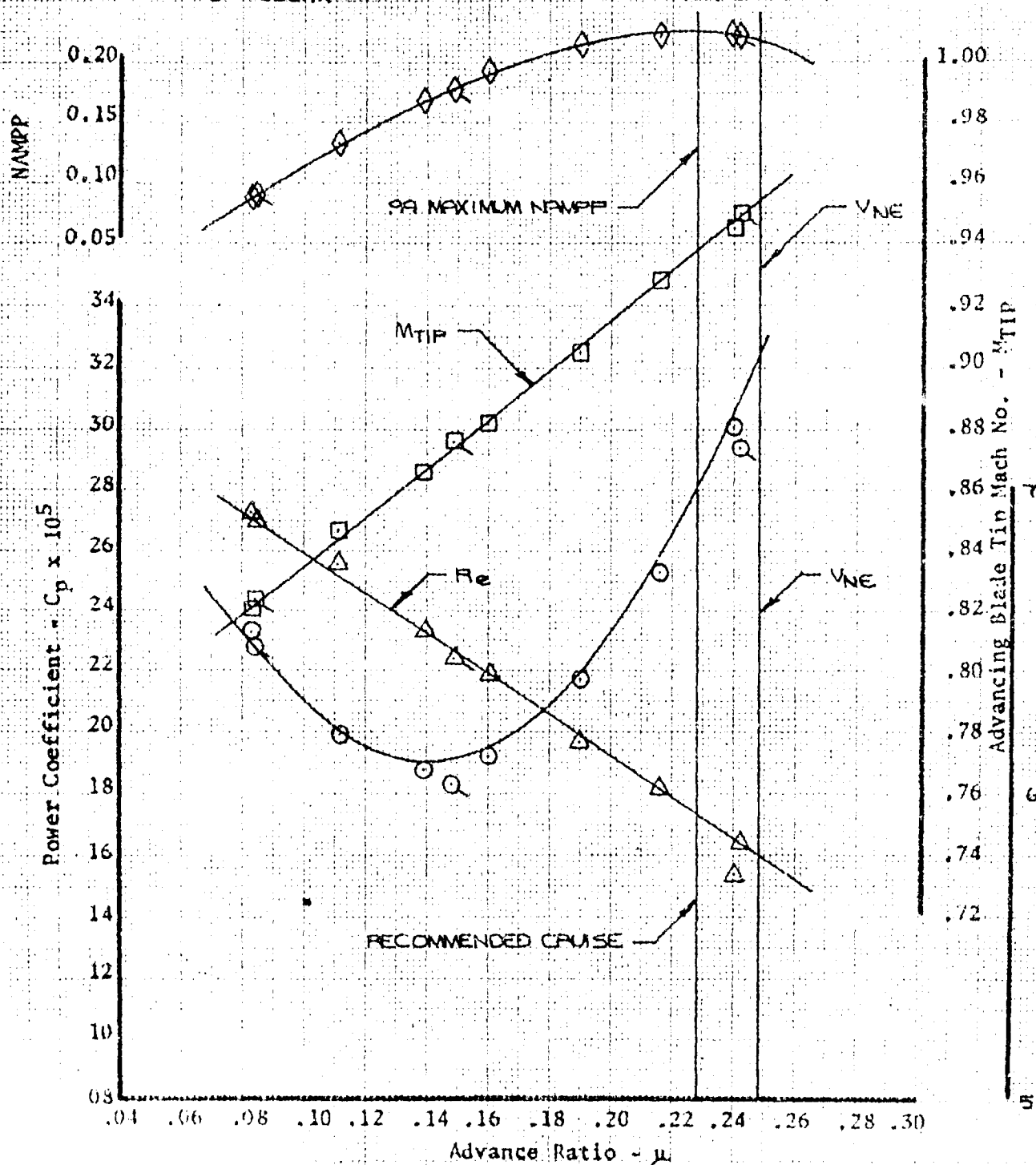
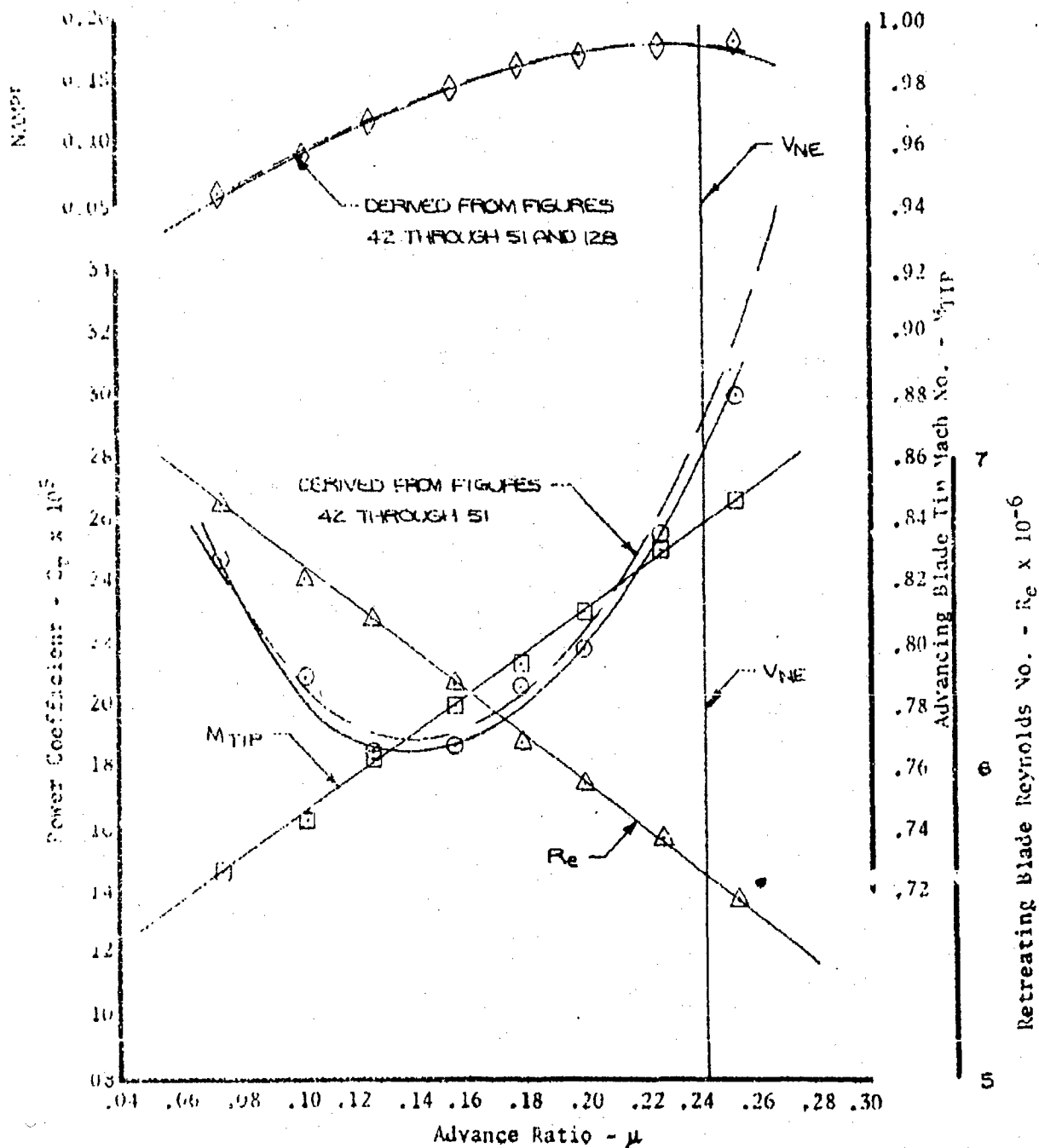


Figure 94. Nondimensional Level Flight Performance

UH-1N USAF S/N 68-10776
T400-CP-400 Engine
Category II

Condition No. = 31
 $C_l = .0049981$
 $W/S_a = 12,249$
 $N_R/\sqrt{S_a} = 300.3$
Avg N_R (rpm) = 301.7
Loading = CLEAN

Avg Pressure Altitude (Ft) = 5,850
Avg Free Air Temp. ($^{\circ}$ C) = 17.9
Avg Gross Weight (Lb) = 9,870
Avg cg Location (Sta) = 137.7



UH-1N USAF S/N 68-10776
T400-CP-400 Engine
Category II

Condition No. = 32
 $C_T = 0.004947$
 $W/\delta_a = 12998$
 $N_R/\sqrt{\delta_a} = 311.0$
Avg N_R (rpm) = 310.4
Loading = CLEAN

Avg Pressure Altitude (Ft) = 8570
Avg Free Air Temp. ($^{\circ}$ C) = 14.0
Avg Gross Weight (Lb) = 9450
Avg cg Location (Sta) = 137.3

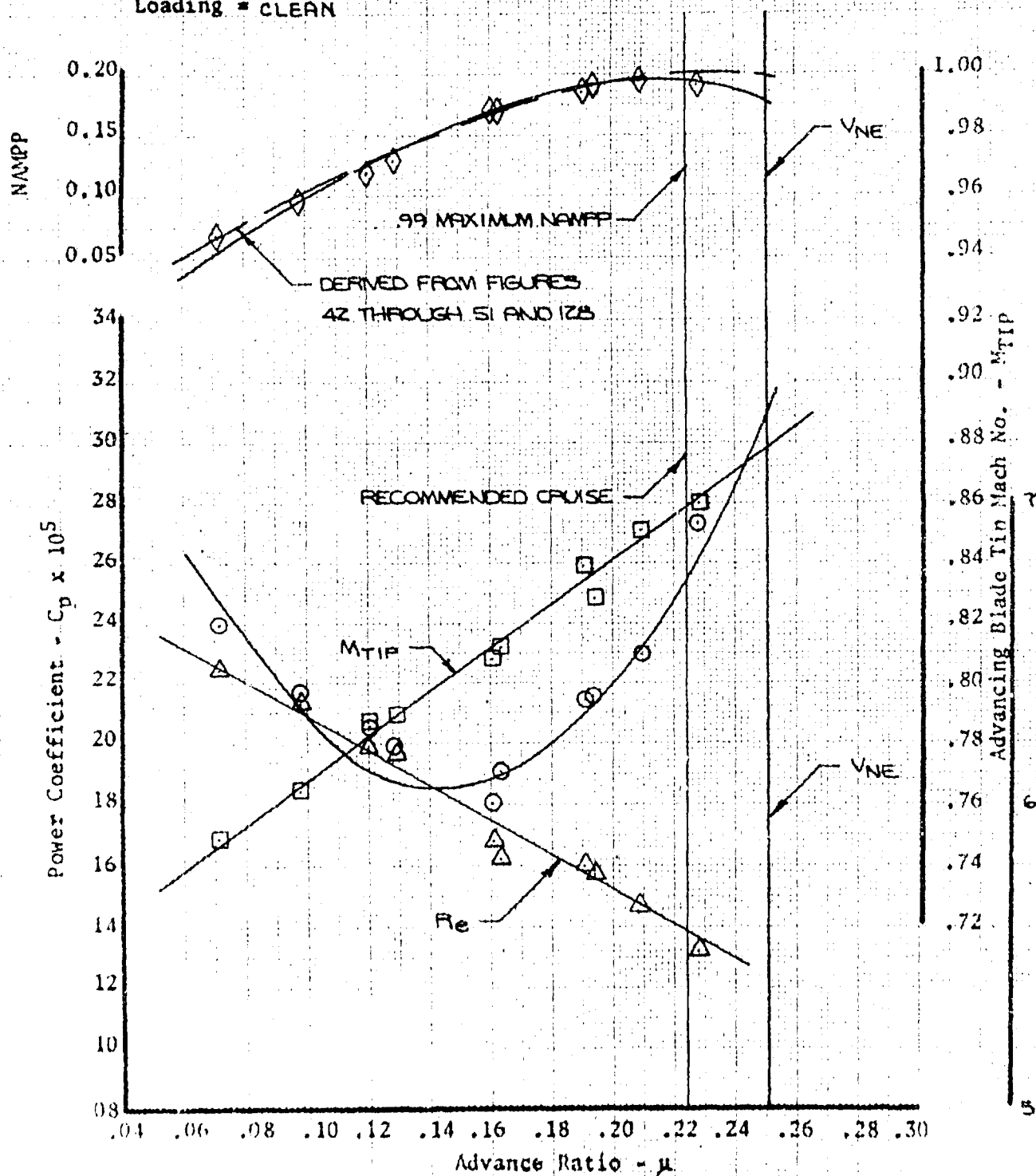


Figure 96. Nondimensional Level Flight Performance

UH-1N USAF S/N 68-10776
T400-CP-400 Engine
Category II

Condition No. = 32

$C_T = 0.004977$

$W/\delta_a = 13055$

$N_R/\sqrt{\delta_a} = 310.7$

Avg N_R (rpm) = 309.6

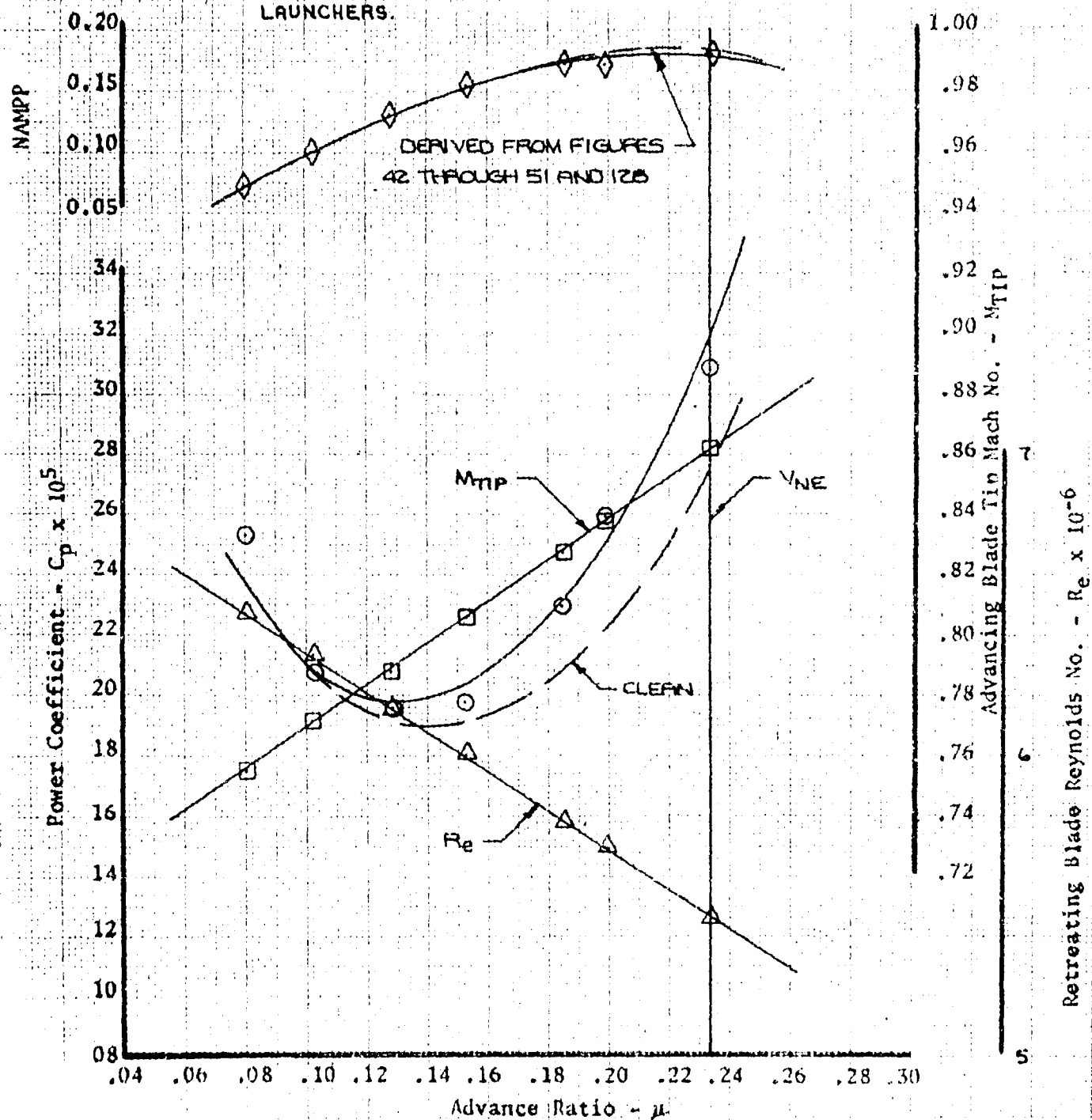
Loading = CARGO DOORS OPEN, TWO XM-93 MINIGUNS EXTENDED
FIXED TO FIRE FORWARD, AND TWO LAU-59/A ROCKET
LAUNCHERS.

Avg Pressure Altitude (Ft) = 8600

Avg Free Air Temp. ($^{\circ}$ C) = 13.1

Avg Gross Weight (Lb) = 9480

Avg cg location (Sta) = 137.7



UH-1N USAF S/N 68-10776
T400-CP-400 Engine
Category II

Condition No. = 33
C_T = 0.0049995
W/δ_a = 13857
N_R/√δ_a = 319.4
Avg N_R (rpm) = 315.5
Loading = CLEAN

Avg Pressure Altitude (Ft) = 11290
Avg Free Air Temp. (°C) = 8.1
Avg Gross Weight (lb) = 9060
Avg cg Location (Sta) = 135.9

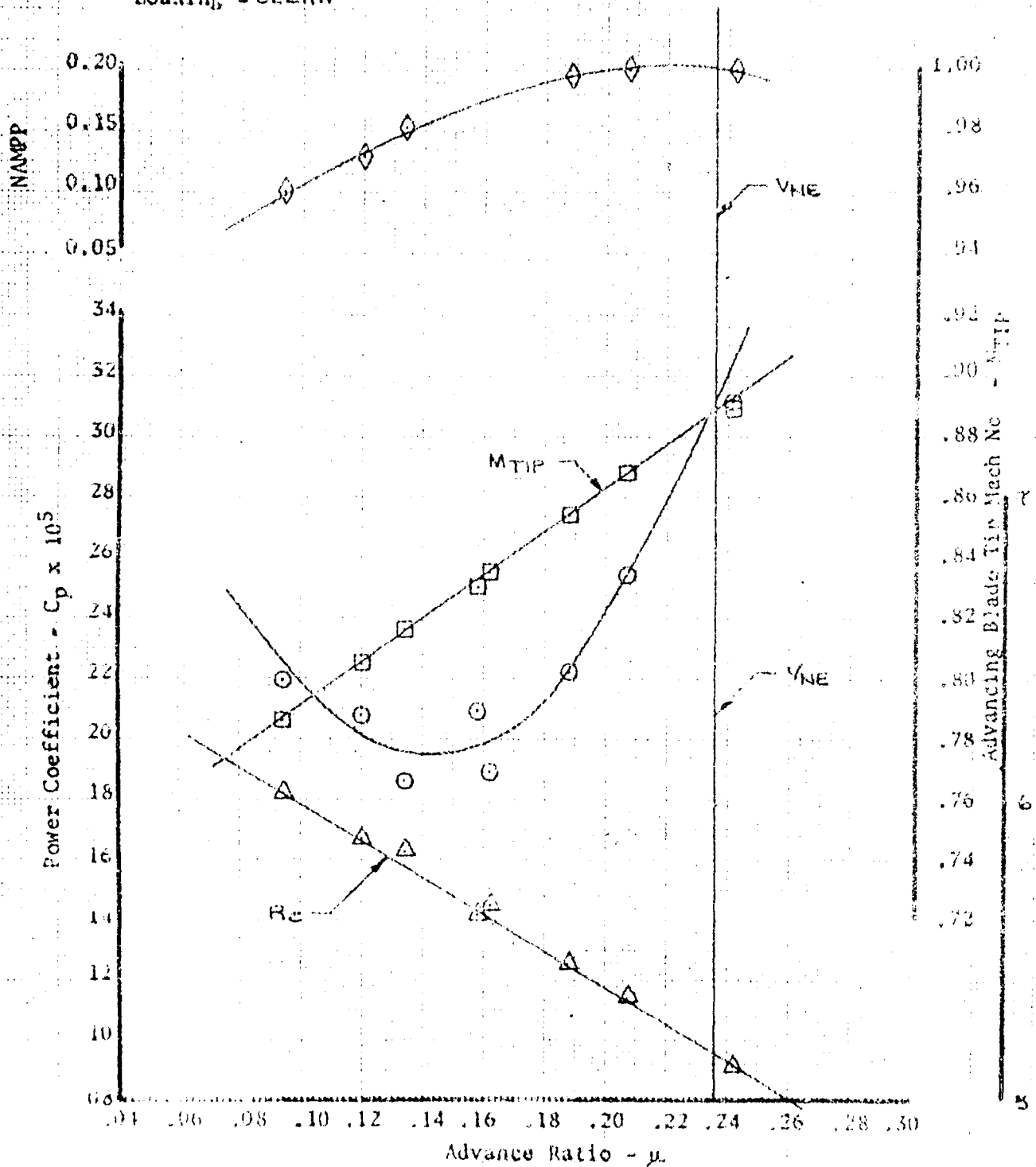


Figure 28 Nondimensional Level Flight Performance

Retreating Blade Reynolds No. - $Re \times 10^{-6}$

U11-1N USAF S/N 68-10776

T400-CP-400 Engine

Category II

Condition No. = 34

$C_T = 0.0049671$

$W/\delta_a = 14,740$

$N_R/\sqrt{\theta_a} = 330.5$

Avg N_R (rpm) = 317.5

Loading = CLEAN

Avg Pressure Altitude (Ft) = 13,390

Avg Free Air Temp. ($^{\circ}\text{C}$) = -7.1

Avg Gross Weight (Lb) = 8,870

Avg cg Location (Sta) = 137.5

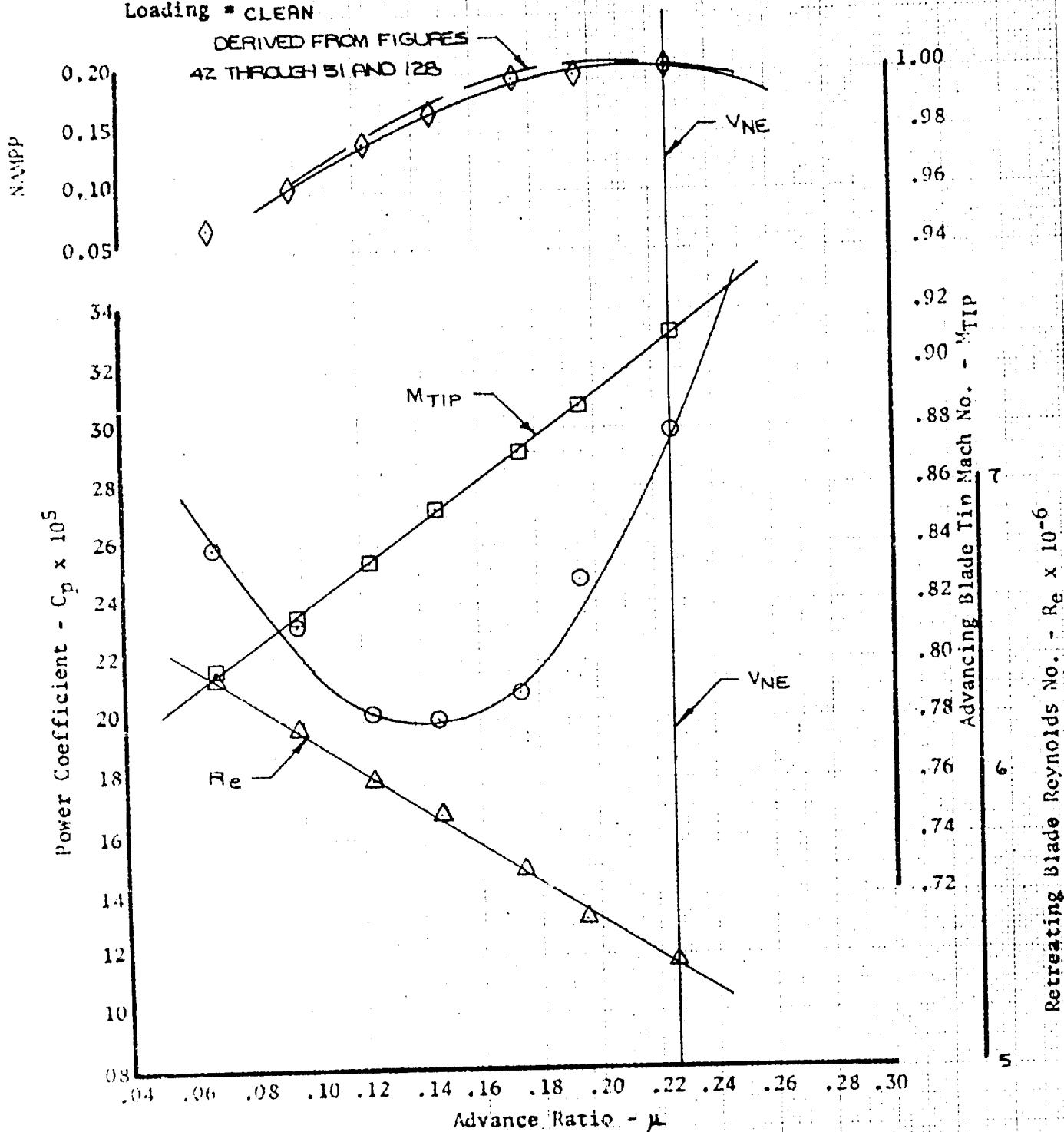


Figure 99. Nondimensional Level Flight Performance.

UHL-1N USAF S/N 68-10776
T400-CP-400 Engine
Category II

Condition No. = 35
Ct = 0.0050
W/δ_a = 15,783
NR/√δ_a = 340.4
Avg NR (rpm) = 311.4
Loading = CLEAN

Avg Pressure Altitude (Ft) = 16,330
Avg Free Air Temp. (°C) = -32.5
Avg Gross Weight (lb) = 8,440
Avg cg Location (Sta) = 137.2
NOTE - TAILED SYMBOLS INDICATE BLEED
AIR ON FOR HEAT

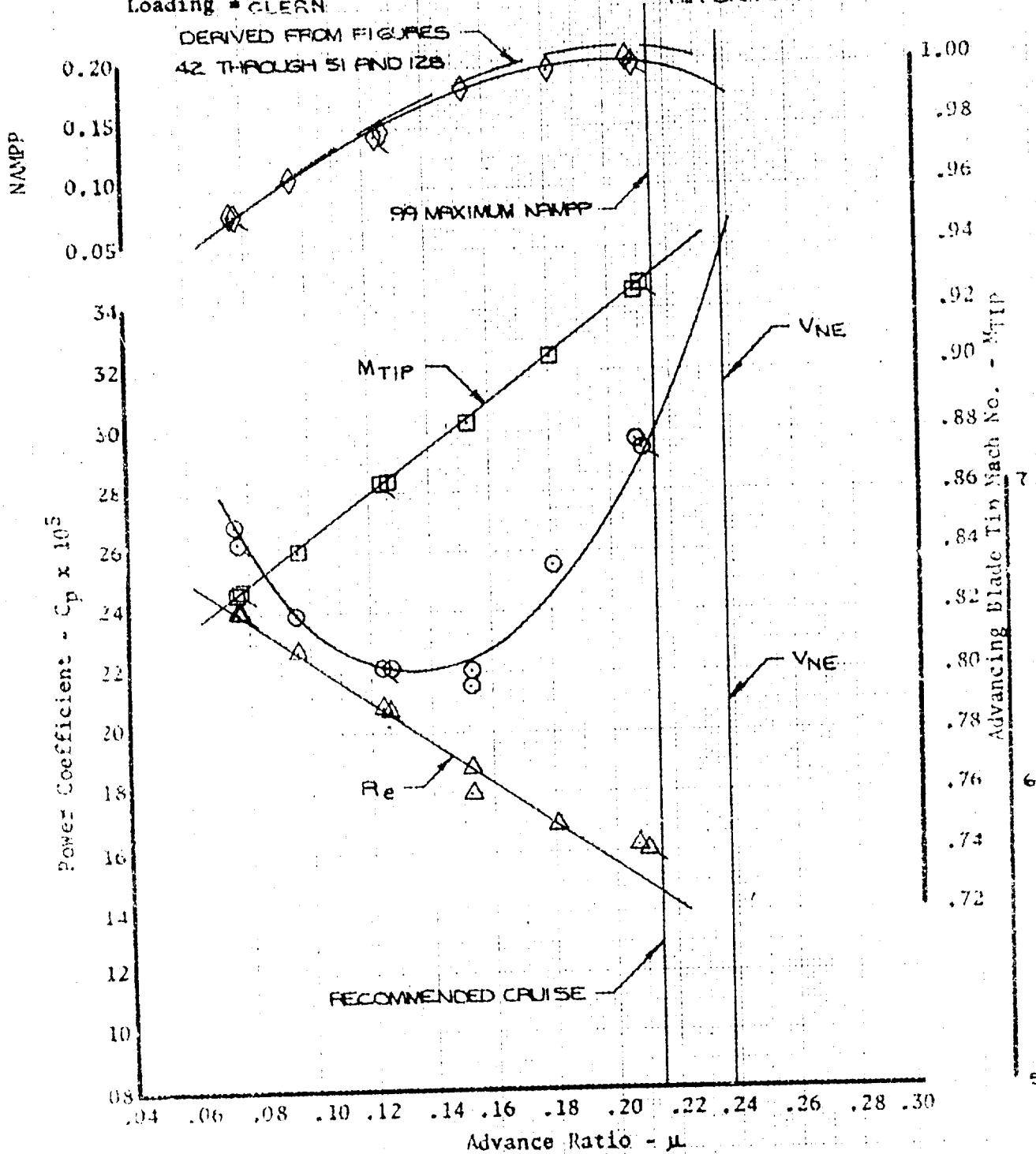


Figure 100. Nondimensional Level Flight Performance

UH-1N USAF S/N 68-10776
T400-CP-400 Engine
Category II

Condition No. = 44
 $C_T = .005283$
 $W/\delta_a = 12,961$
 $NR/\sqrt{\theta_a} = 300.5$
Avg N_R (rpm) = 301.0
Loading = CLEAN

Avg Pressure Altitude (Ft) = 8,240
Avg Free Air Temp. ($^{\circ}$ C) = 16.0
Avg Gross Weight (Lb) = 9,540
Avg cg Location (Sta) = 137.6

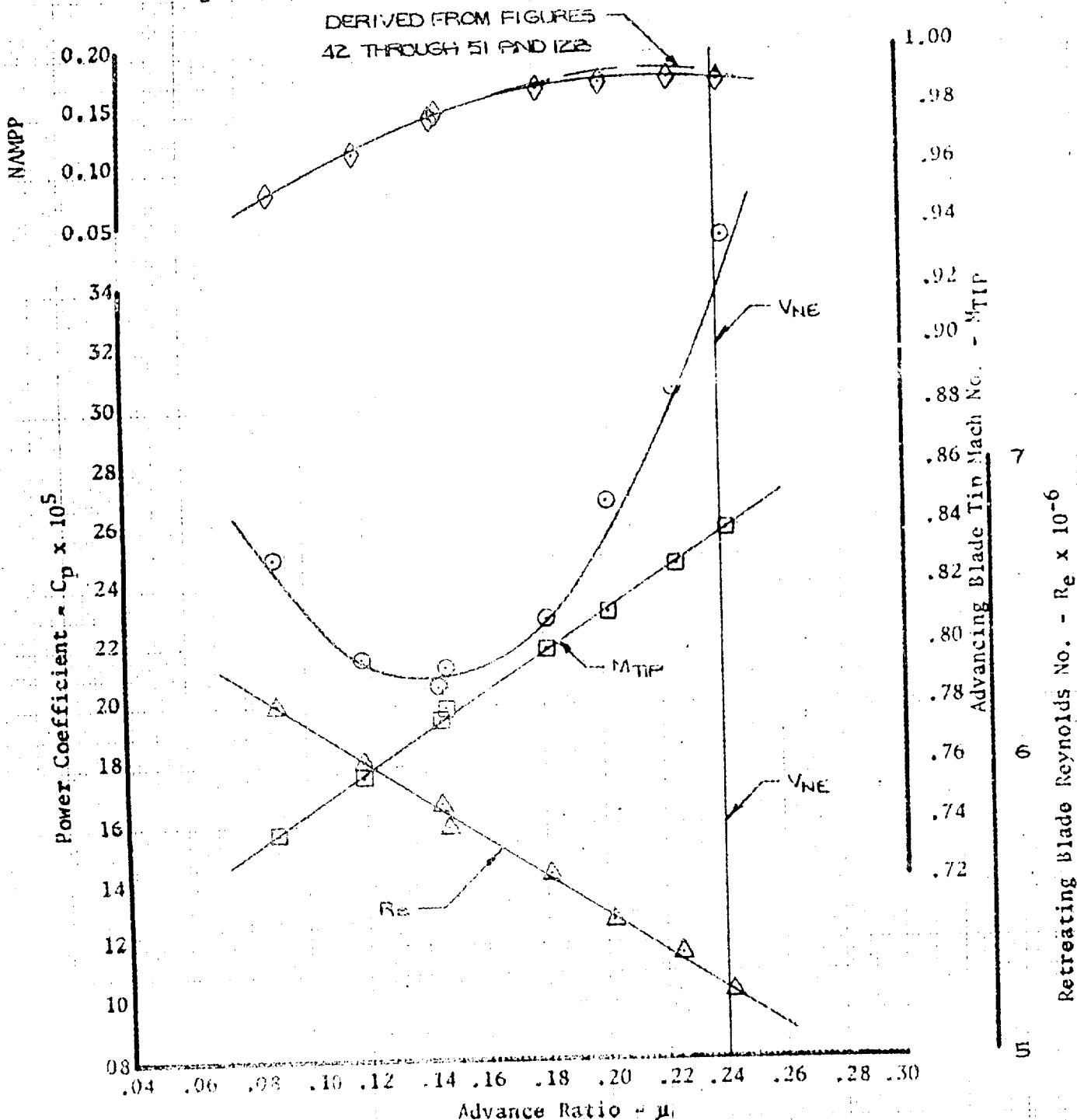


Figure 101. Nondimensional Level Flight Performance

UH-1N USAF S/N 68-10776

T400-CP-400 ENGINE

CATEGORY II

LEVEL FLT

COND NO. = 19. G.W. = 9900 LB

$C_T = 0.043$ $H_p = 1,760$ FT

$N_H / N_E = 300$ RPM FAT = 24.0 deg C

$N_H = 305$ RPM C.G. = 137 IN (MD)

SYMBOL

| PILOT SEAT | C.G. | ACCEL |
|------------|------|-------|
| △ | ○ | 2/REV |
| △ | ○ | 4/REV |
| ▲ | ● | 6/REV |

VERTICAL VIBRATION

LATERAL VIBRATION

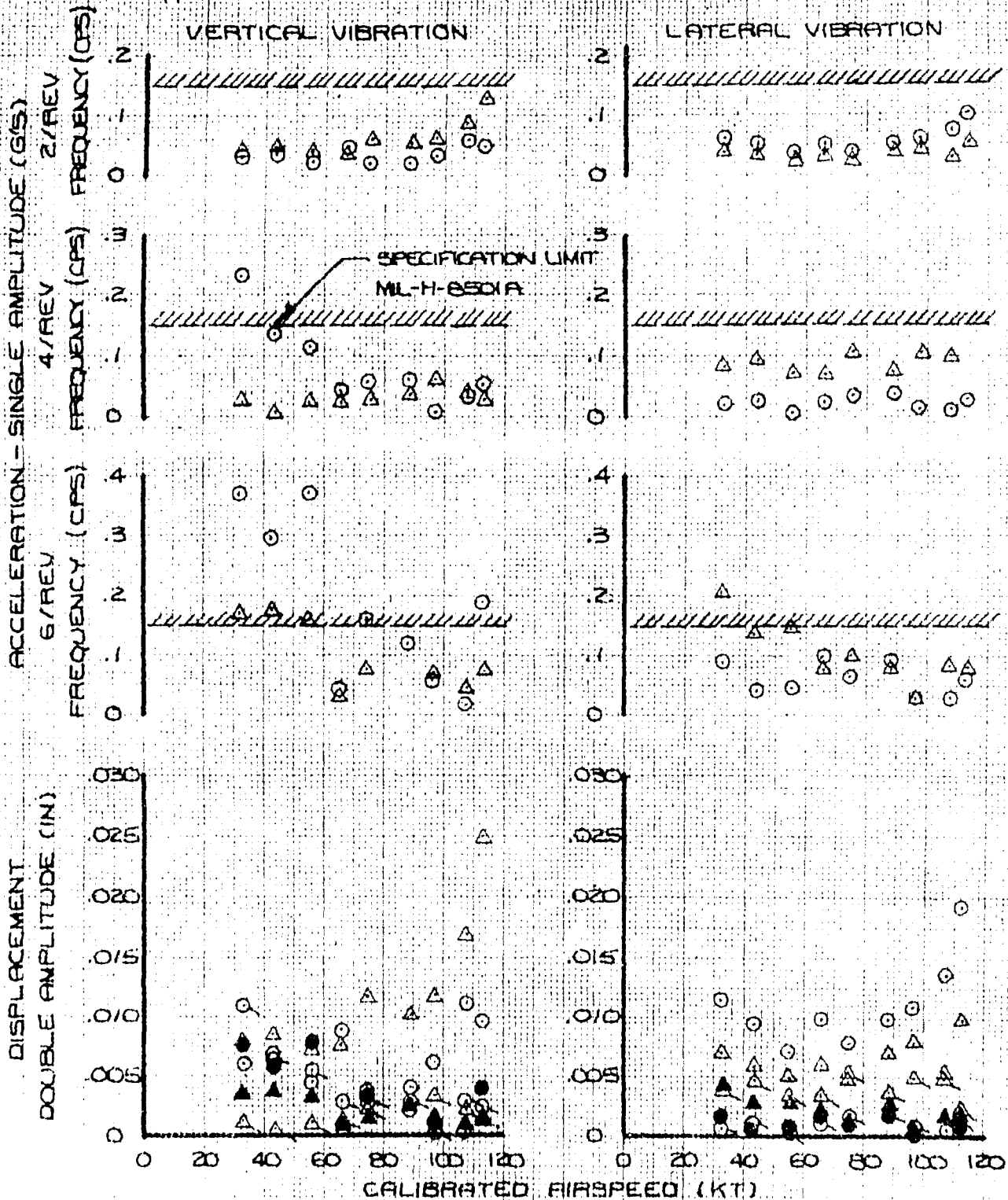


FIGURE 102 VIBRATION CHARACTERISTICS

UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

LEVEL FLT

COND NO. = 20

$C_T = .0043$

$N_R / N_S = 310 \text{ RPM}$

$N_R = 312 \text{ RPM}$

GW. = 9,180 LB

$H_p = 5,460 \text{ FT}$

$\text{PWT} = 180 \text{ deg C}$

C.G. = 137 IN (MID)

SYMBOL

PILOT SEAT

C.G.

ACCEL

Δ

\circ

2/REV

\triangle

\circ

4/REV

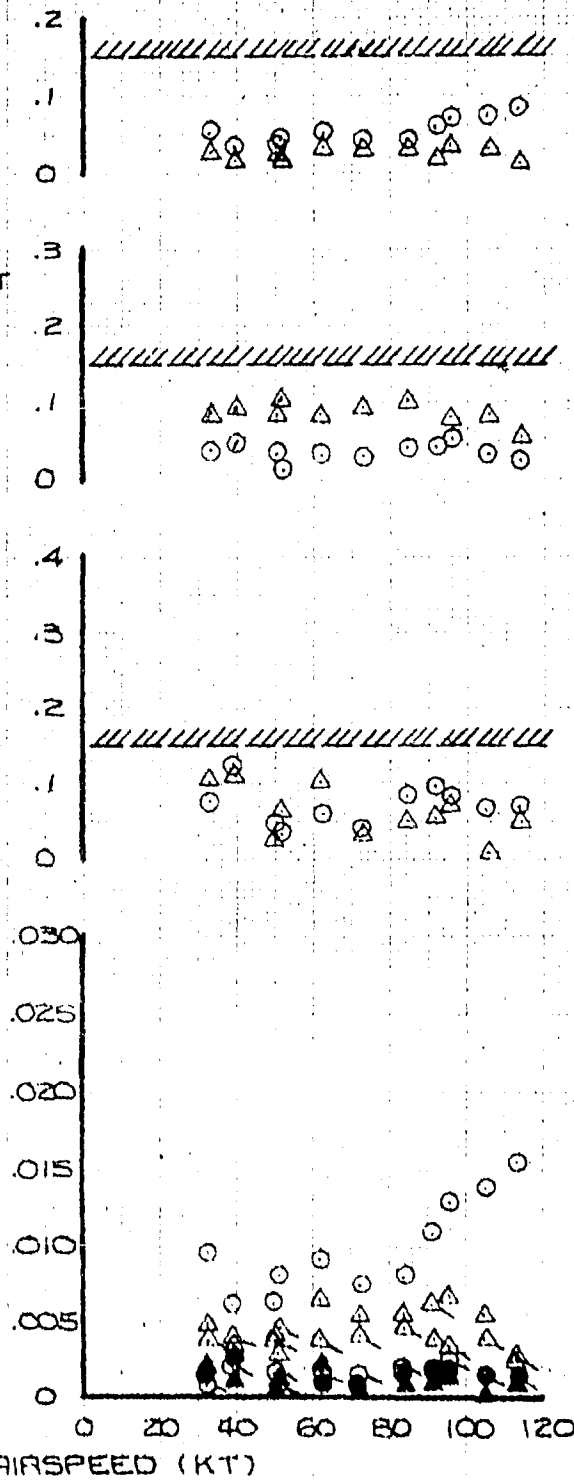
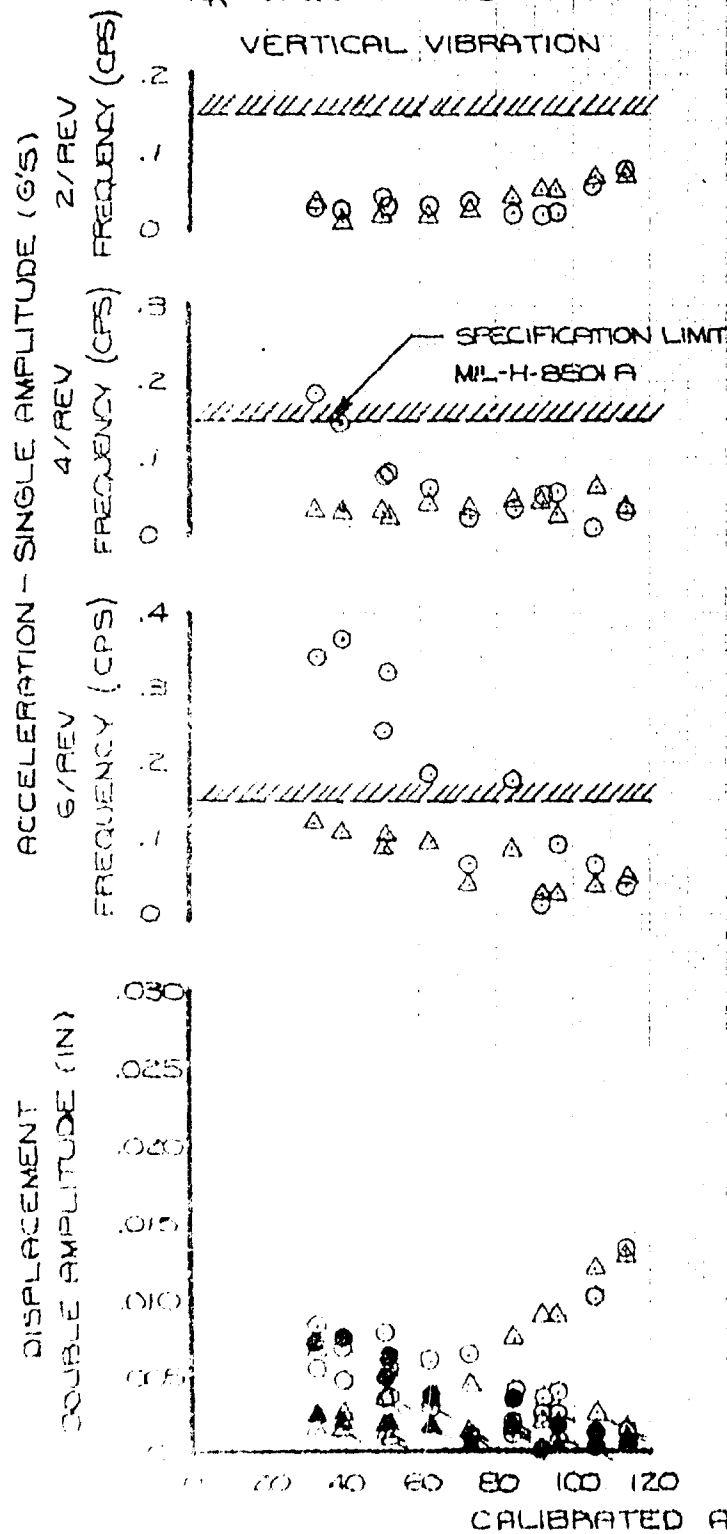
\blacktriangle

\bullet

6/REV

VERTICAL VIBRATION

LATERAL VIBRATION



UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

LEVEL FLT
COND NO. -21 GW=9140 LB
C_p=1043 H_p=7320 FT
N₁/N₈=320 RPM FAT=50 deg C
N₄=314 RPM C.G.=13/IN (MID)

SYMBOL
PILOT SEAT C.G. MODEL
△ 0 2/REV
△ 0 4/REV
▲ ● 6/REV

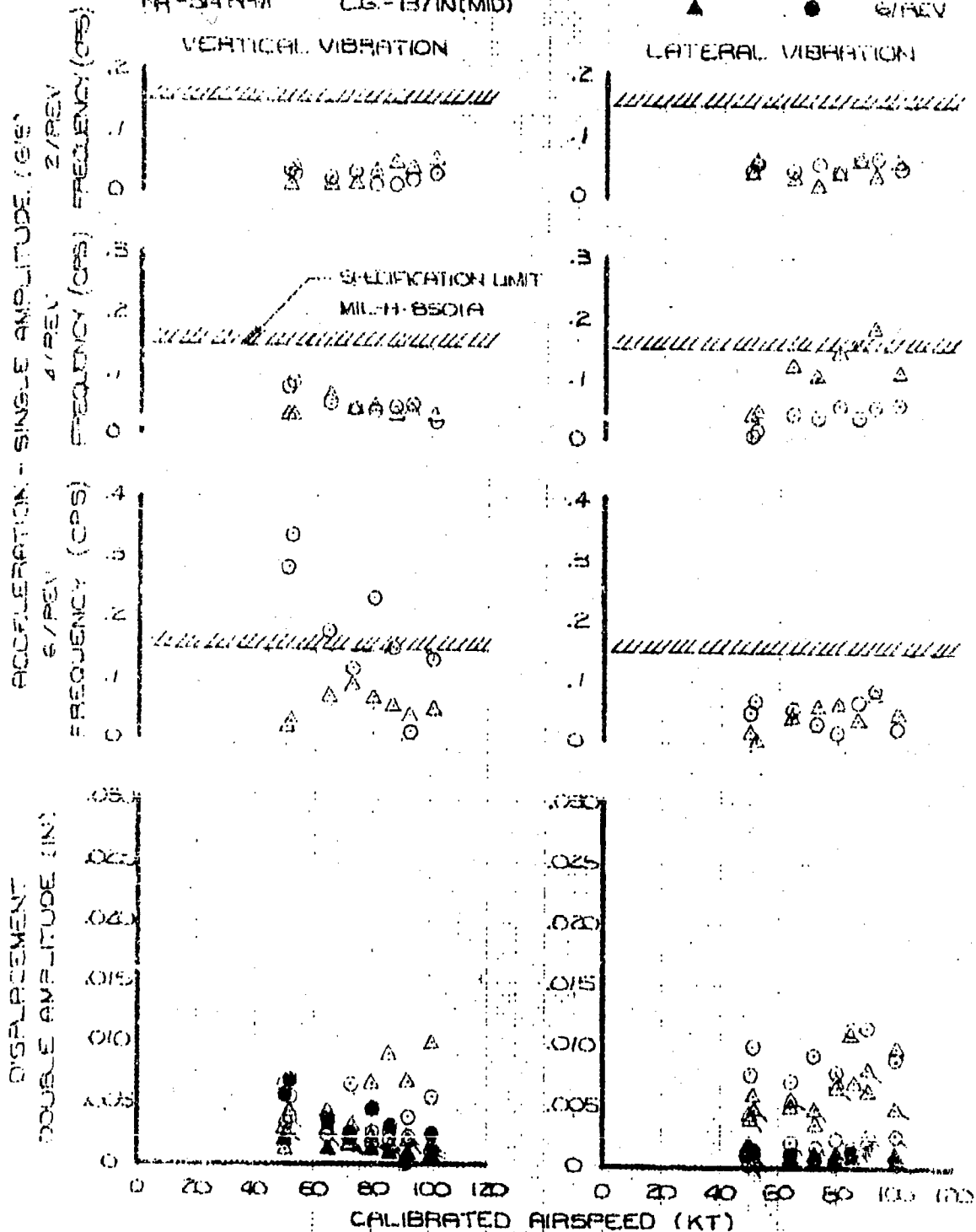


FIGURE 104 VIBRATION CHARACTERISTICS

CATEGORY II

$N_R = 322 \text{ RFM}$

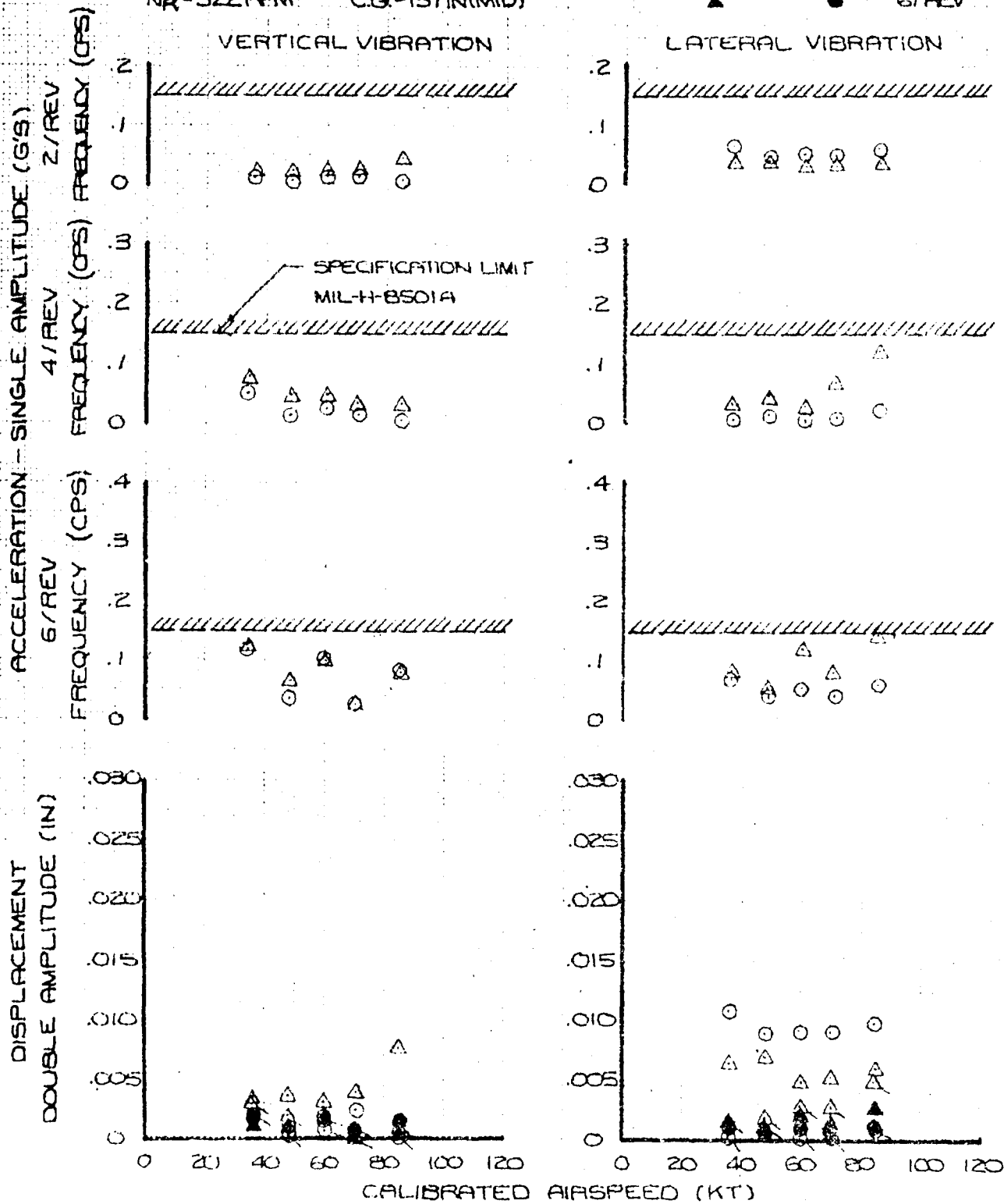
C.G. = 197 IN (MID)

ACCEL

2 / REV

4/REV

6/REV



UH-1H USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

LEVEL FLT
COND NO. = 23 G.W. = 9,520 LB
C_T = .0043 H_P = 9,520 FT
N₁/N₂ = 340 RPM FAT = -23.0 deg C
N_P = 34 RPM G.G. = 137 IN (MID)

SYMBOL
PILOT SEAT C.G. ACCEL
△ ○ 2/REV
△ ○ 4/REV
▲ ● 6/REV

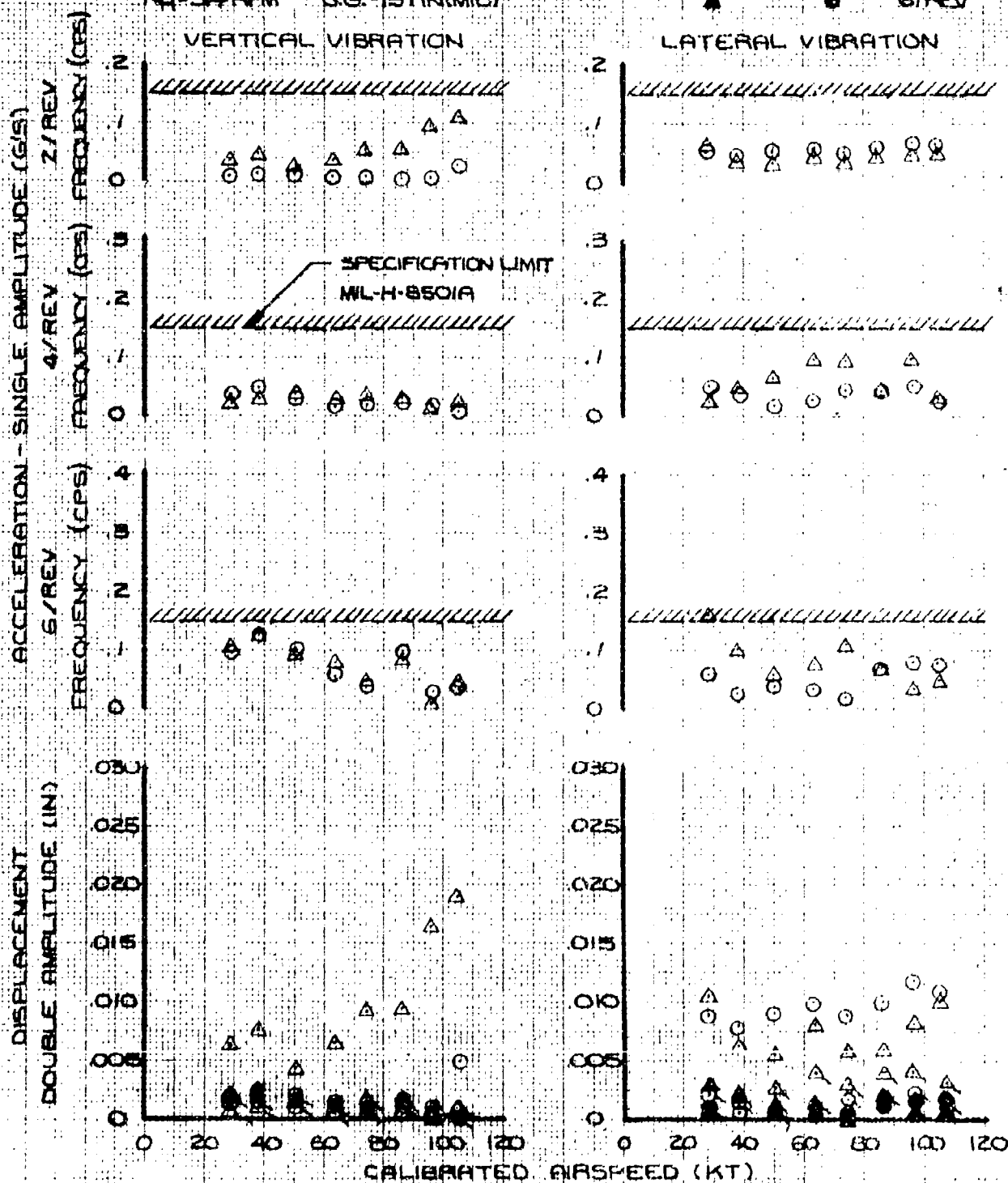


FIGURE 106 VIBRATION CHARACTERISTICS

UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

LEVEL FLT
COND NO. = 10 GW = 8580 LB
C_T = 0.0035 Hp = 4350 FT
N₁/55 = 320 RPM FAT = 6.0 deg C
N_R = 316 RPM C.G. = 133.5 IN (FWD)

| SYMBOL | | |
|------------|------|-------|
| PILOT SEAT | C.G. | ACCEL |
| △ | ○ | 2/REV |
| △ | ○ | 4/REV |
| ▲ | ● | 6/REV |

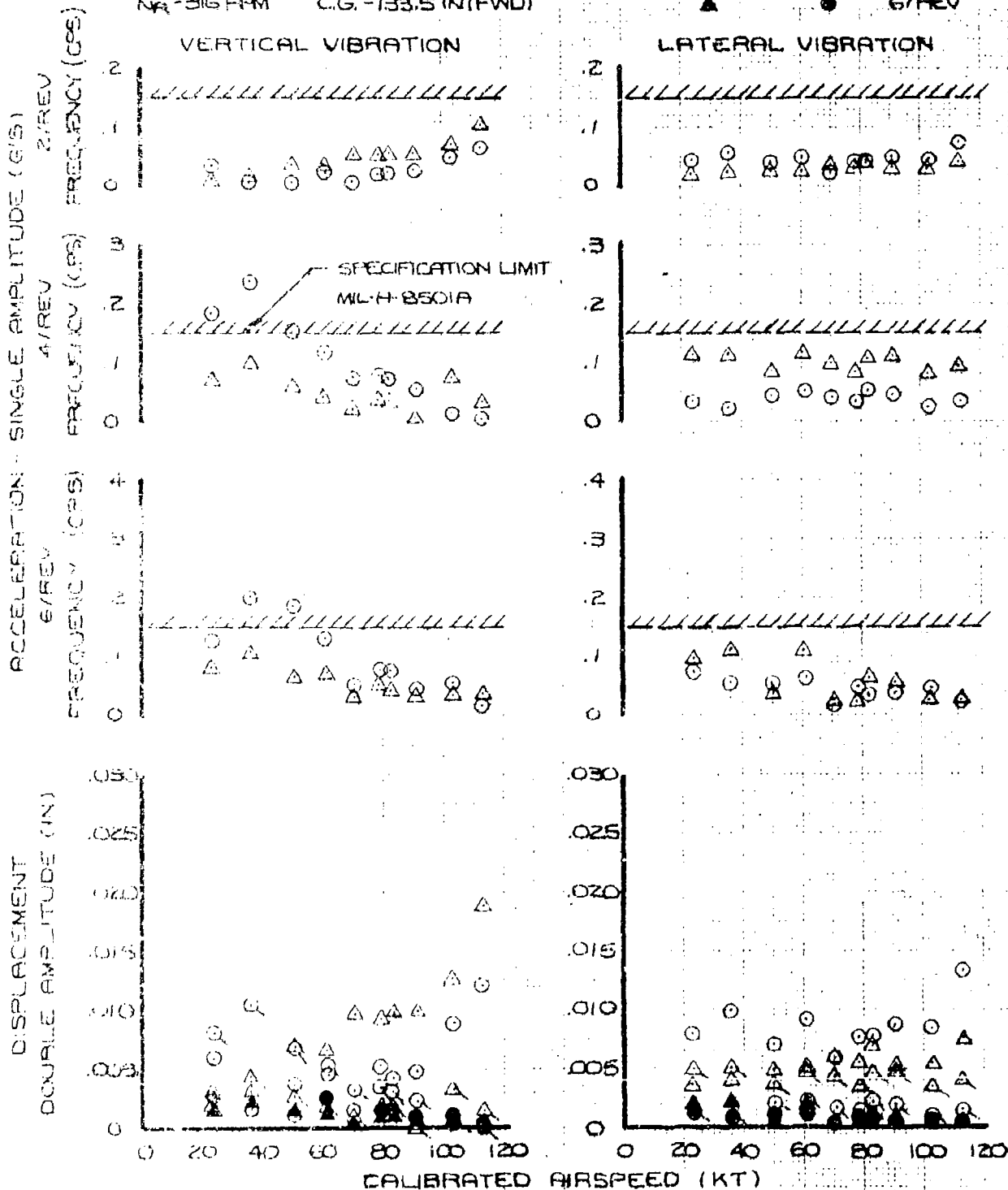


FIGURE 107 VIBRATION CHARACTERISTICS

UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

LEVEL FLT

COND NO. 10

G.W. = 8,740 LB

C_T = .0036

H_p = 3,860 FT

N_H/5 = 320 RPM FAT = 5.0 deg C

N_H = 315 RPM

C.G. = 137 IN (MD)

SYMBOL

PILOT SEAT

C.G.

ACCEL.

△

○

2/REV

△

○

4/REV

▲

●

6/REV

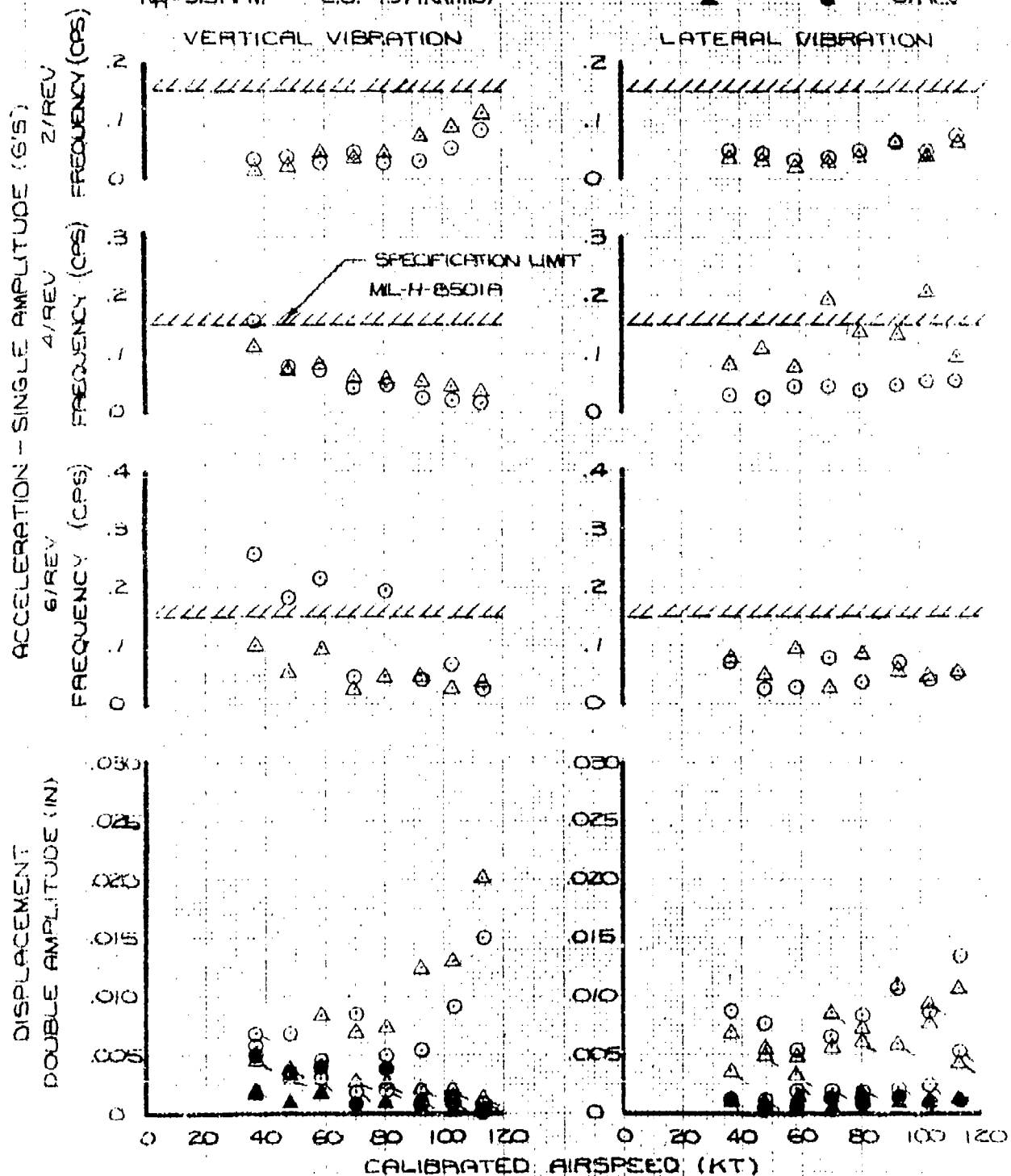


FIGURE 108 VIBRATION CHARACTERISTICS

UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

LEVEL FLT

COND NO. 10

G.W. = 8,520 LB

C_T = .0036

H_p = 4,490 FT

N_R/5 = 320 RPM

FAT = 5.0 deg C

N_R = 317 RPM

C.G. = 143.1 IN (AFT)

SYMBOL

PILOT SEAT

C.G.

ACCEL

△

○

2/REV

△

○

4/REV

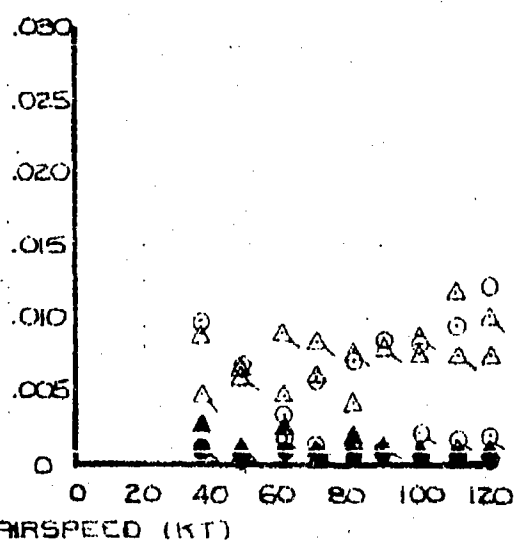
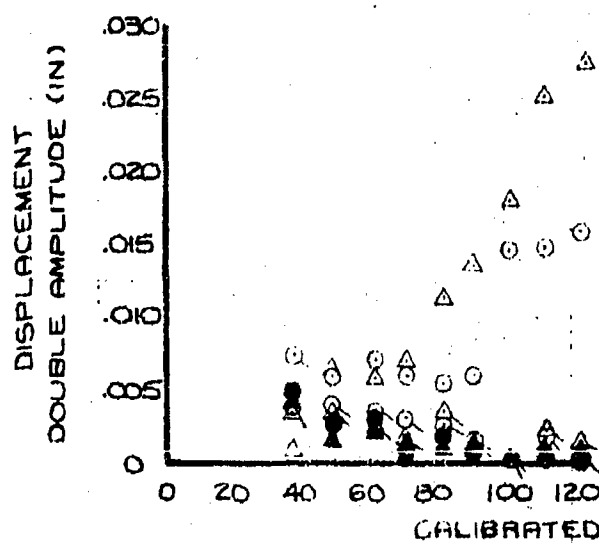
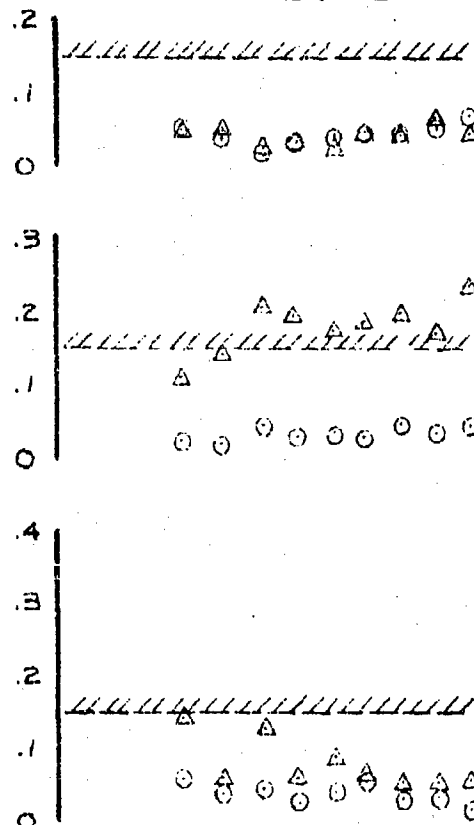
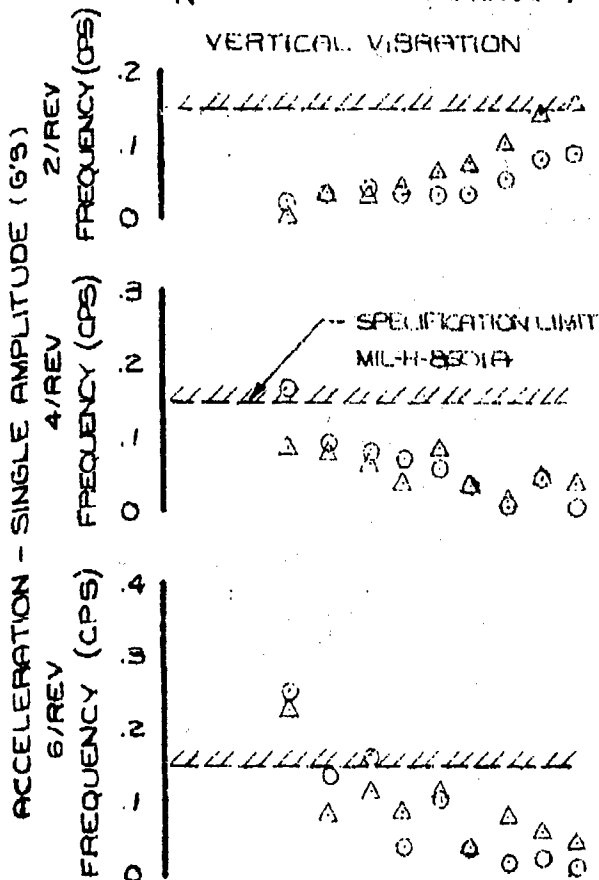
▲

●

6/REV

VERTICAL VIBRATION

LATERAL VIBRATION



UH-1N USAF SIN 68-10775

T400-CP-400 ENGINE

CATEGORY II

LEVEL FLT

COND NO. 33

GW = 9060 LB

CT = 0.050

H₁ = 11,230 FT

N_{1/5} = 320 RPM

W = 80 deg C

N₂ = 310 RPM

C.G. = 157 IN (MOM)

SYMBOL

PILOT SEAT

Δ

COCKPIT

○

ENGINE

□

WHEEL

×

TAIL

+

ROTOR

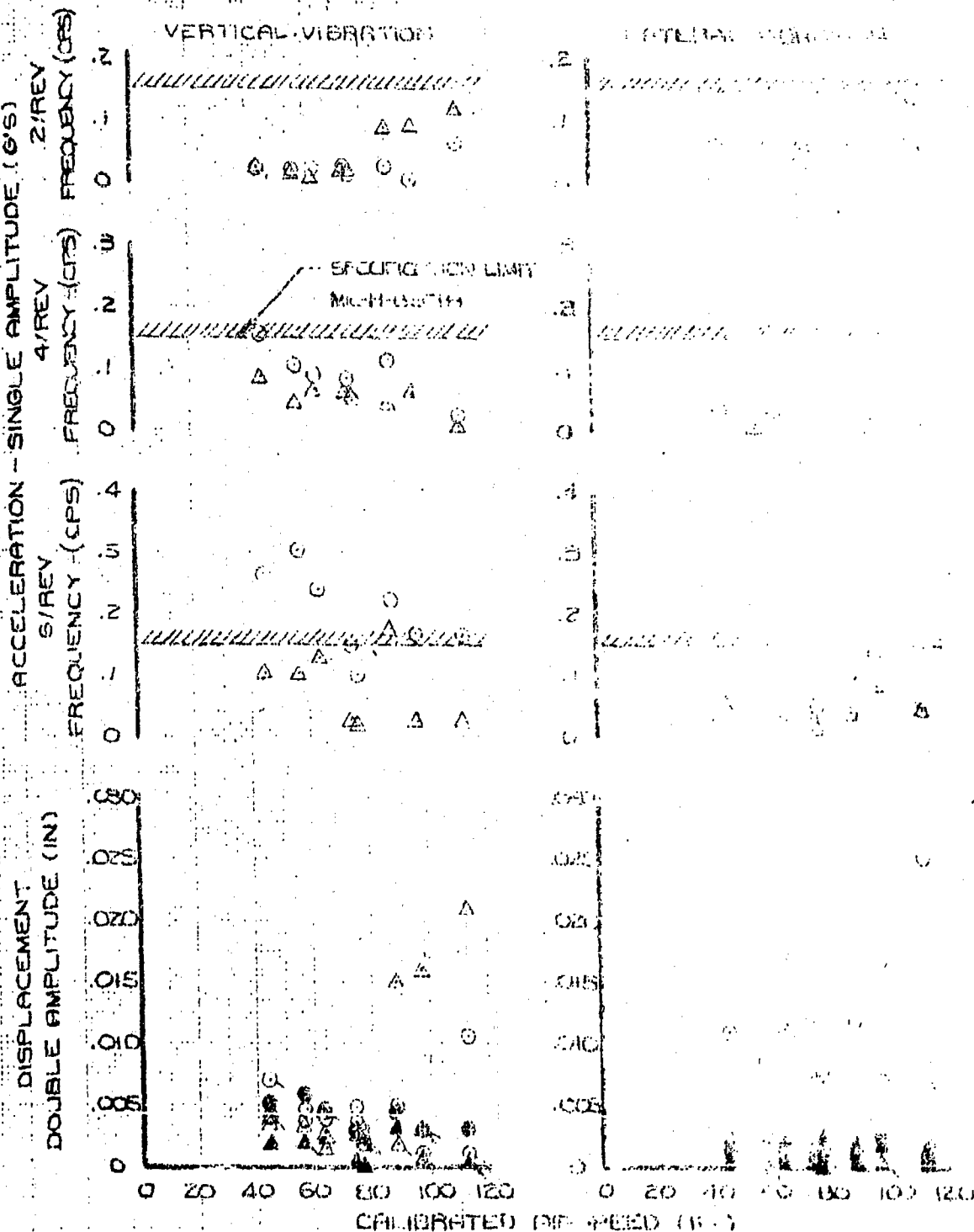


FIGURE 110 VIBRATION CHARACTERISTICS

UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

LEVEL FLT
COND NO. = 2 GW. = 7960 LB
 $C_T = .0032$ $H_P = 9.270$ FT
 $N_R/5 = 520$ RPM $FAT = 4.0$ deg C
 $N_R = 312$ RPM C.G. = 137 IN (MD)

| SYMBOL | | |
|------------------|-----------|-------|
| PILOT SEAT | G.G. | ACCEL |
| Δ | \circ | 2/REV |
| ∇ | \circ | 4/REV |
| \blacktriangle | \bullet | 6/REV |

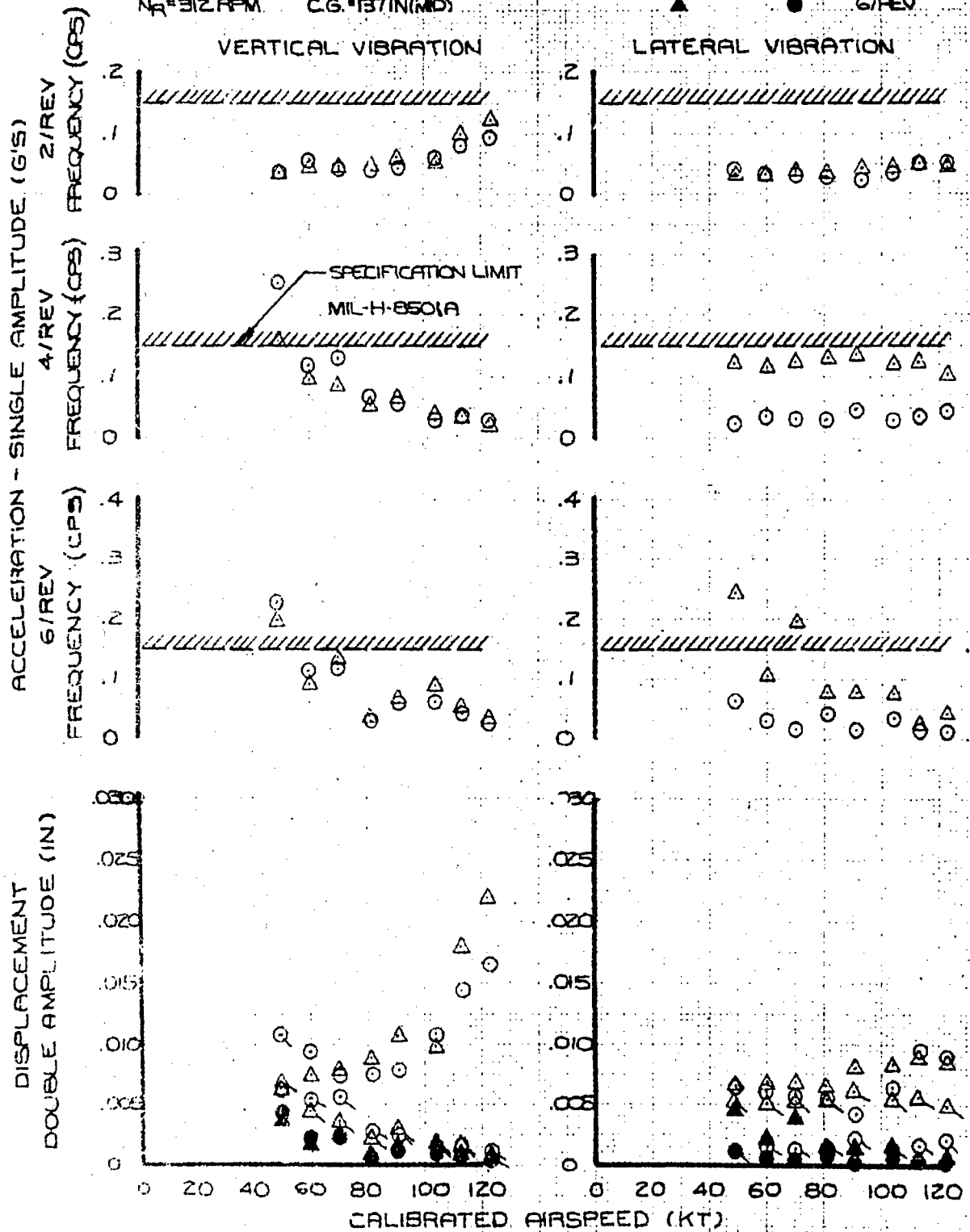


FIGURE III VIBRATION CHARACTERISTICS

UK-1N USAF S/N 63-10776
T400-CP-400 ENGINE
CATEGORY II

| | NR | NRAS | CALC | LOAD |
|--------|-------|-------|-------|------|
| SYMBOL | (RPM) | (RPM) | (%) | (%) |
| □ | 3160 | 310 | 50.0 | 35 |
| ○ | 3200 | 320 | 32.52 | 2 |
| △ | 3150 | 340 | 36.24 | 10.5 |

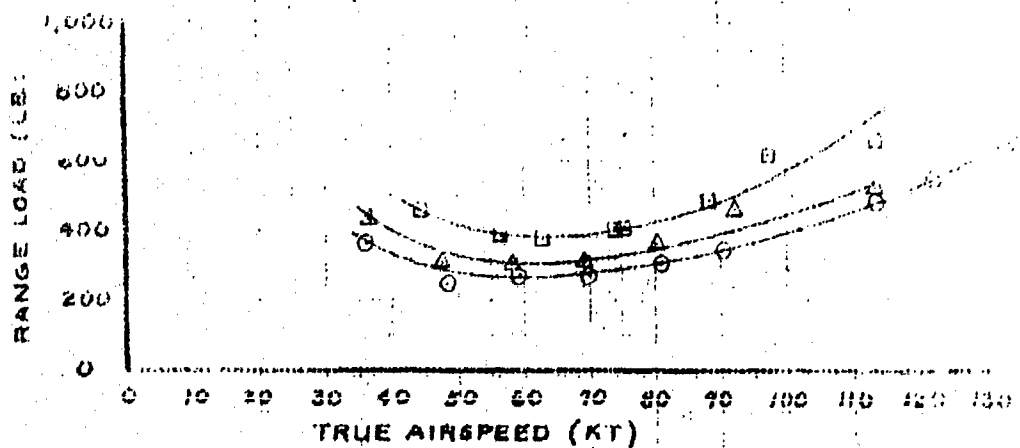
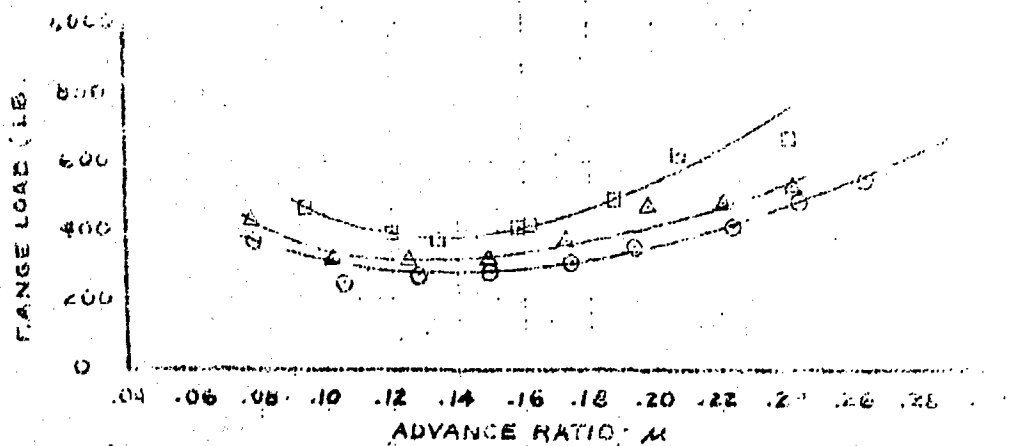
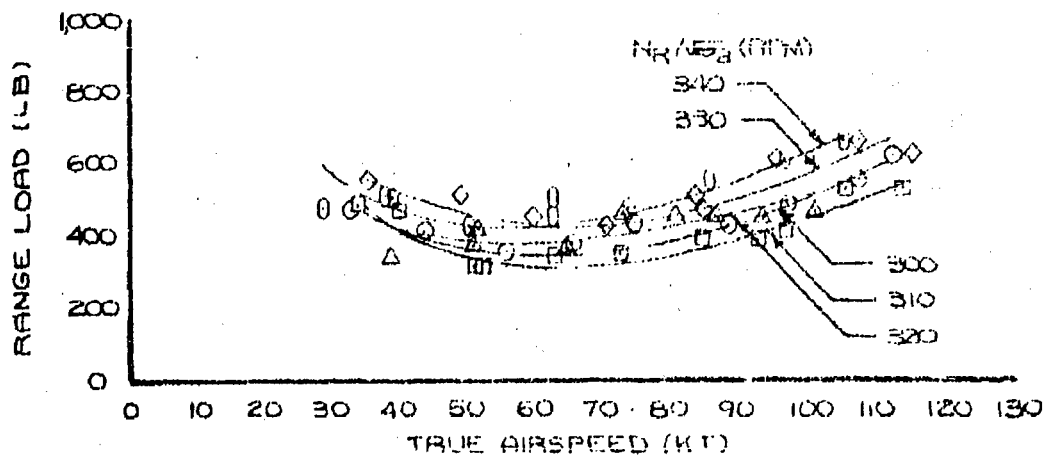
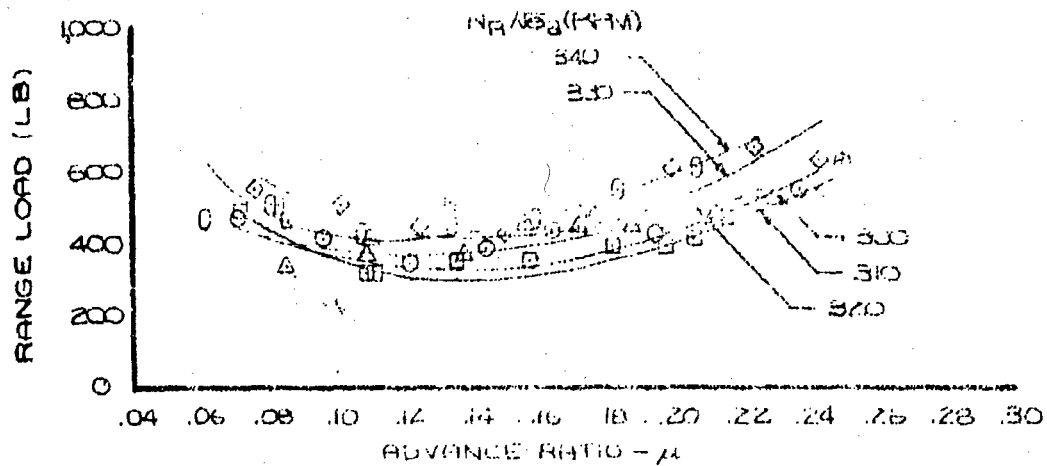


FIGURE 112 . PITCH LINK LOAD SURVEY

UH-1N USAF S/N 68-10776
T400-CP-430 ENGINE
CATEGORY II

| SYMBOL | NR (RPM) | NR/52.5 (RPM) | CTX101 | LEVEL FLIGHT CONDITION NO. |
|--------|-------------|------------------|--------|-------------------------------|
| ○ | 3050 | 300 | 42.96 | 19 |
| □ | 3130 | 310 | 42.30 | 20 |
| △ | 3140 | 320 | 43.20 | 21 S/E |
| ◇ | 3220 | 330 | 42.51 | 22 |
| ○ | 3140 | 340 | 43.36 | 23 |



UH-1H USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

| SYM | GROSS WT.(LB) | PRESS. ALT.(FT) | RPM (deg C) | RPM (RPM) |
|-----|------------------|--------------------|----------------|--------------|
| ○ | 8,520 | 5,000 | 9.0 | 294 (91%) |
| △ | 8,430 | 5,000 | 9.0 | 324 (100%) |
| □ | 8,500 | 5,000 | 14.0 | 384 (103.5%) |

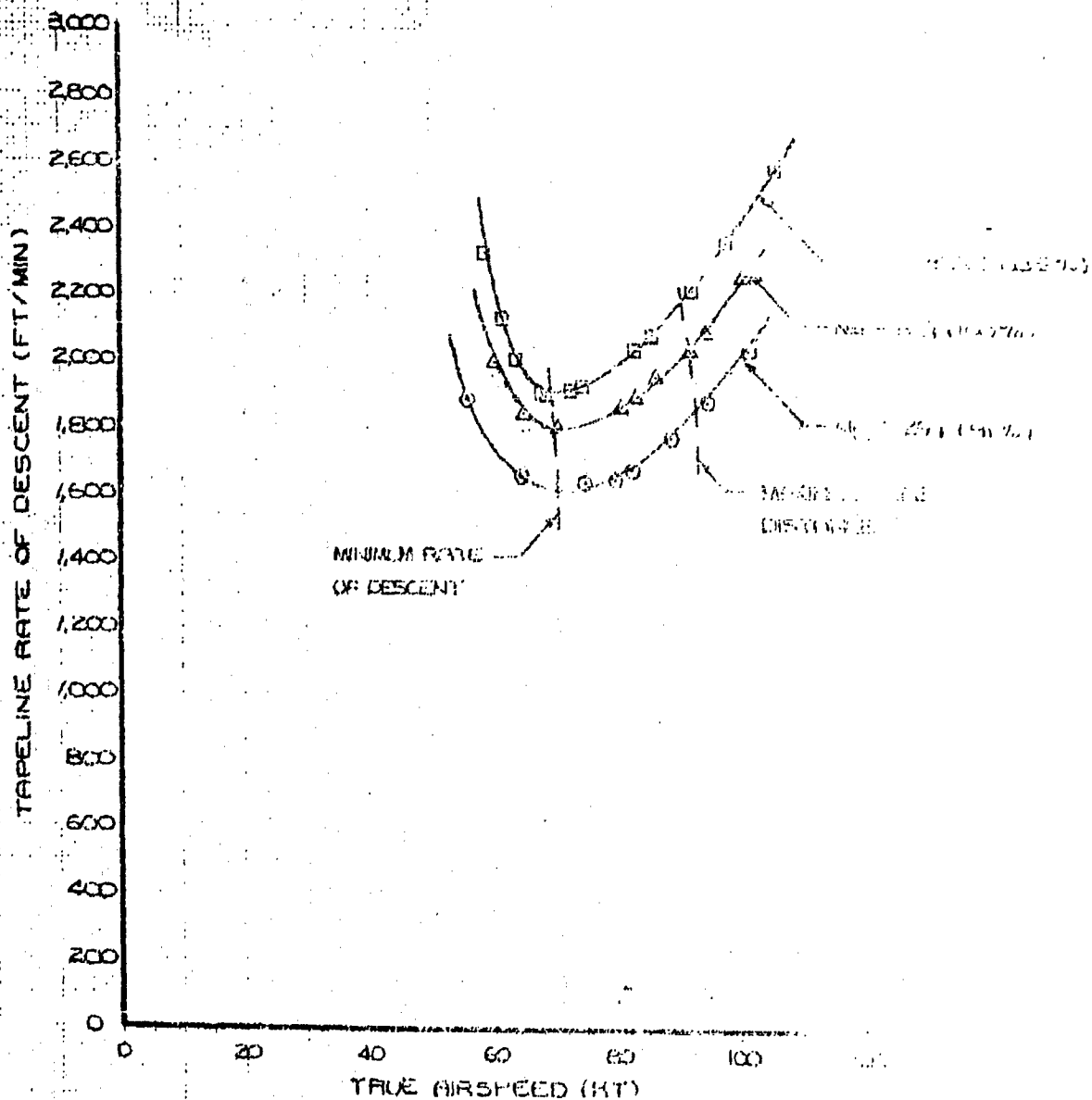
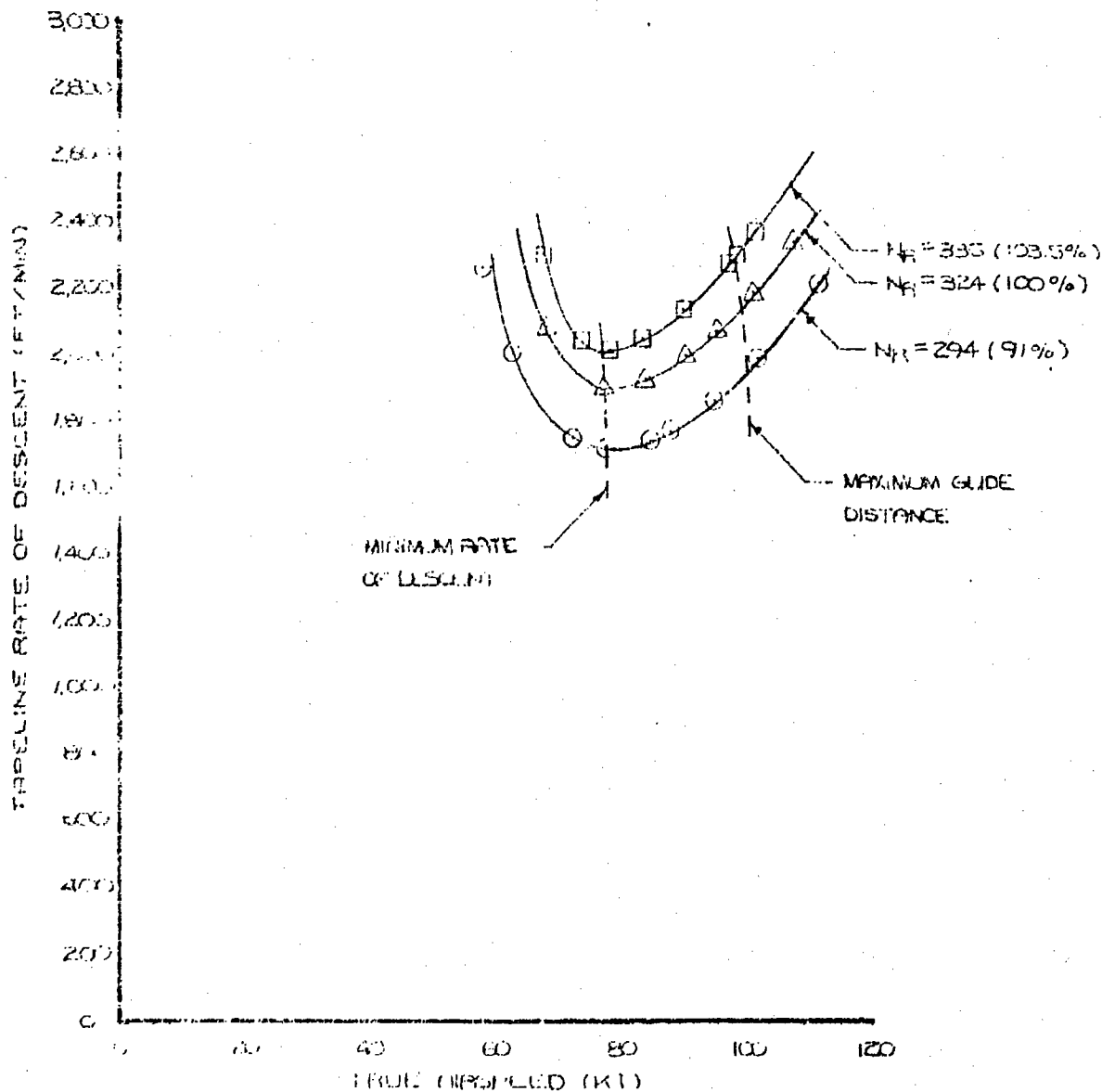


FIGURE 114 SAWTOOTH AUTOROTATIONAL DESCENT PERFORMANCE 119

UH-1N USRF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

| | GROSS | PRESS | FAT | ROTOR |
|-----|---------|----------|---------|----------------|
| SYM | WT.(LB) | ALT.(FT) | (deg C) | SPEED (RPM) |
| ○ | 8,640 | 10,000 | -3.0 | 294 (91%) |
| △ | 8,610 | 10,000 | -3.0 | 324 (100%) |
| □ | 8,400 | 10,000 | -3.0 | 335 (103.5%) |



UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

| <u>SYM</u> | <u>GROSS WT.(LB)</u> | <u>PRESS ALT.(FT)</u> | <u>PAT (degC)</u> | <u>ROTOR SPEED (RPM)</u> |
|------------|--------------------------|---------------------------|-----------------------|----------------------------------|
| O | 9,970 | 5,000 | 2.0 | 294 (91%) |
| Δ | 10,040 | 5,000 | 3.0 | 324 (100%) |
| □ | 10,000 | 5,000 | 7.0 | 335 (103.5%) |

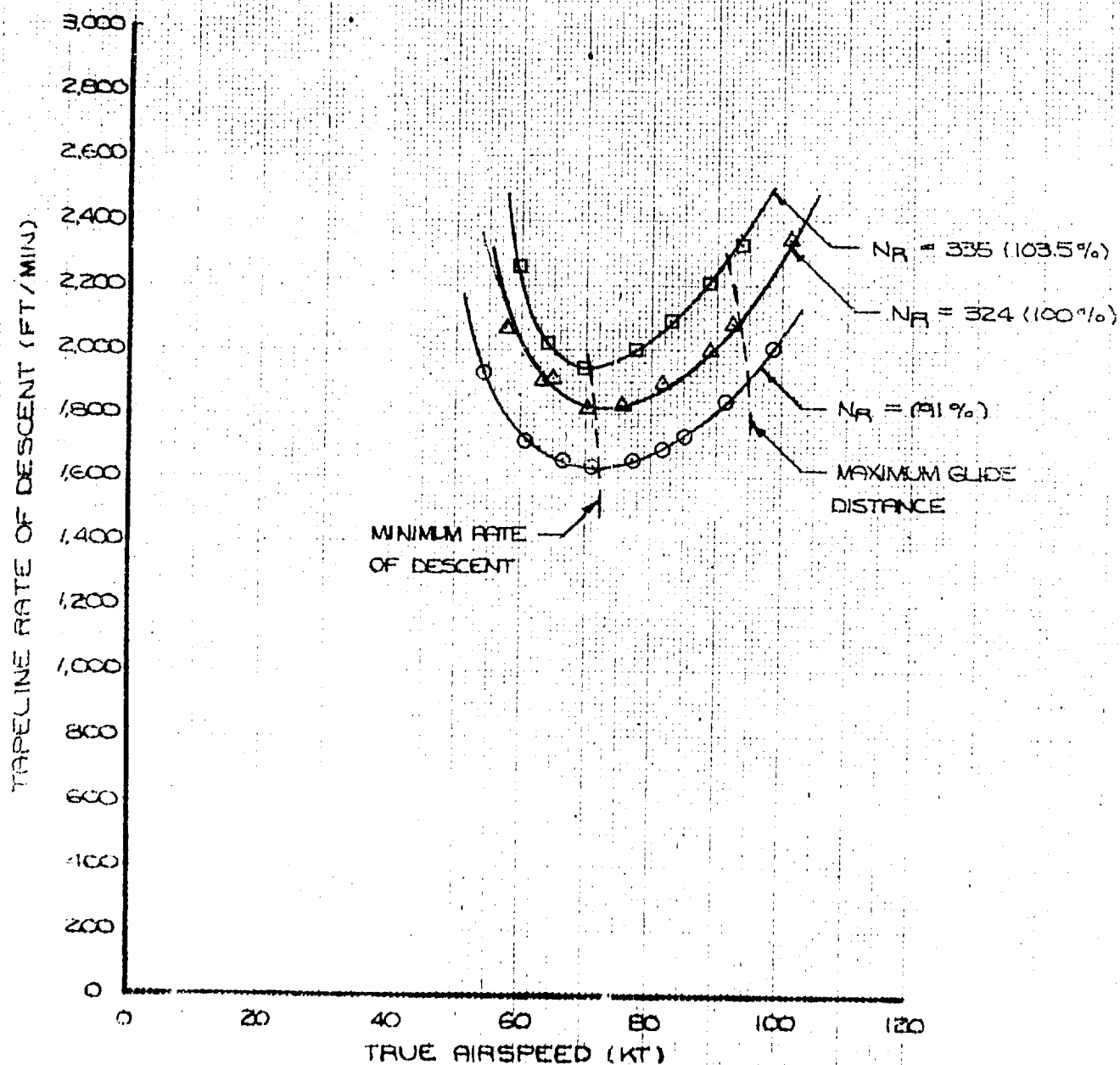
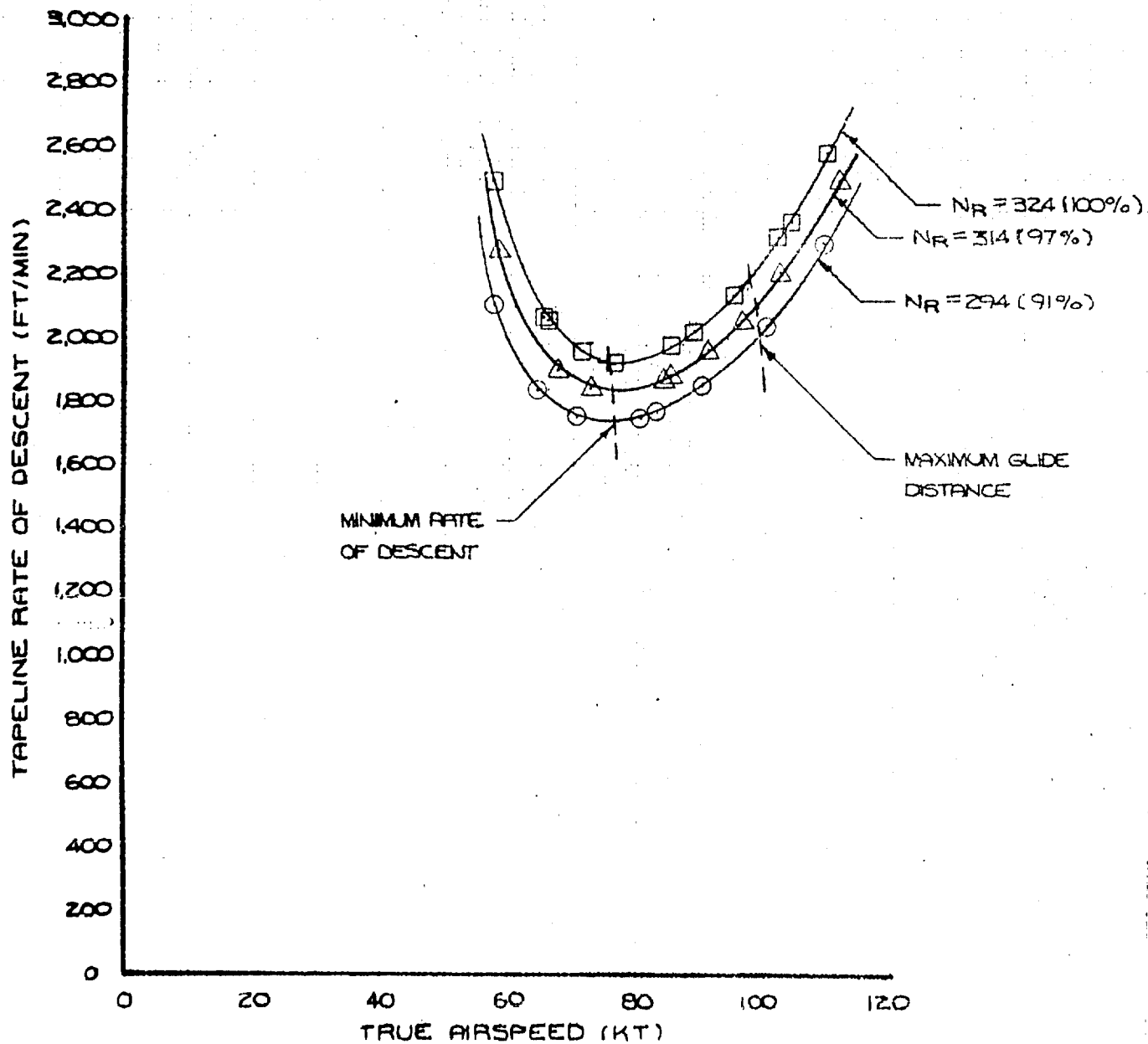


FIGURE 116 SAWTOOTH AUTOROTATIONAL DESCENT PERFORMANCE

UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

| <u>SYM</u> | <u>GROSS WT.(LB)</u> | <u>PRESS. ALT.(FT)</u> | <u>FAT (deg C)</u> | <u>ROTOR SPEED (RPM)</u> |
|------------|--------------------------|----------------------------|------------------------|----------------------------------|
| ○ | 10,210 | 10,000 | -12.0 | 294 (91%) |
| △ | 9,840 | 10,000 | -11.0 | 314 (97%) |
| □ | 9,930 | 10,000 | -10.0 | 324 (100%) |



UH-1N USAF S/N 68-10776

T400-CP-400 ENGINE

CATEGORY II

NOTE

1. SYMBOLS DESIGNATED
BY A SLASH (/) REFER
TO SLOPE ANGLE LIMITED
BY FUSELAGE-GROUND
PROXIMITY

SYMBOL

GROSS WEIGHT
(LB)

CENTER OF GRAVITY LOCATION

LONGITUDINAL
(IN)LATERAL
(IN)

○

8500

137 (MID)

0

△

10,000

137 (MID)

0

□

10,000

141 (AFT)

0

▽

10,000

133 (FWD)

0

◇

10,000

134 (FWD)

5.2 RIGHT

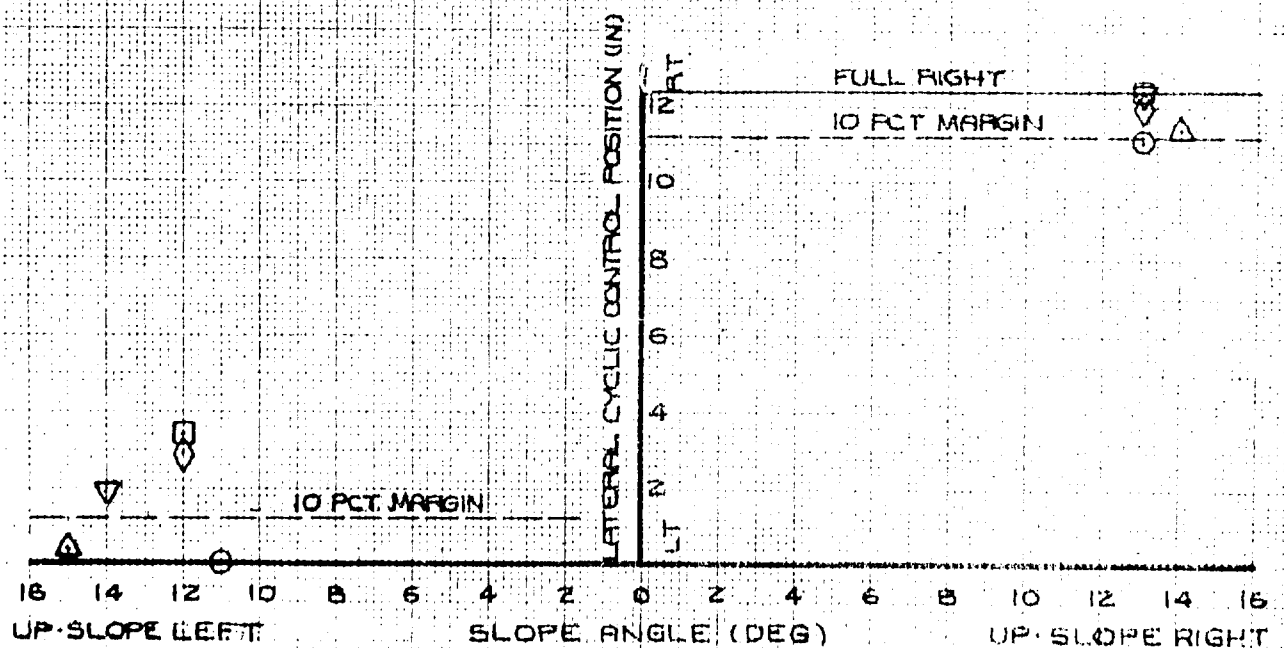
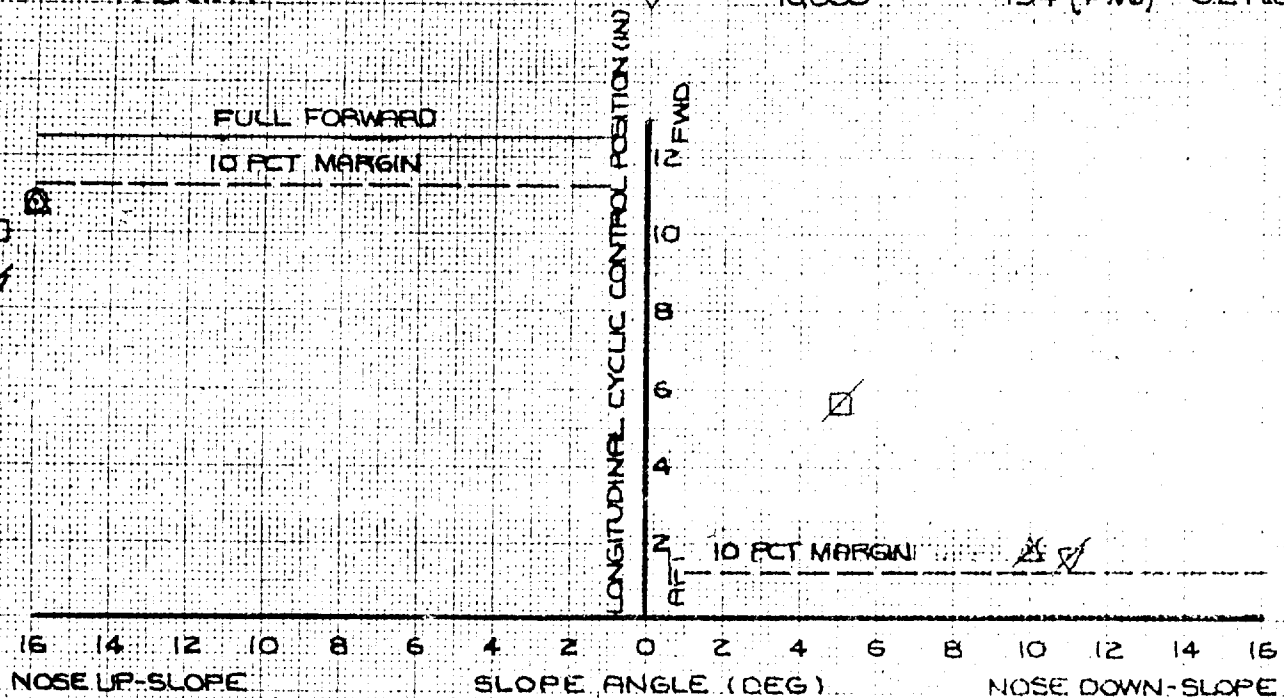


FIGURE 118 SLOPE LANDING SLOPE ANGLE LIMITS AND CYCLIC CONTROL POSITIONS

UH-1N USAF S/N 68-10776

T400-CP-400 ENGINE

CATEGORY II

| SYM | GROSS WT. (LB) | PRESS. ALT. (FT) | FAT (deg C) | $\frac{SHP_A}{SHP_R}$ |
|-----|-------------------|---------------------|----------------|-----------------------|
| ○ | 8,520 | 3,870 | 15.0 | 0.7964 |
| □ | 8,520 | 4,210 | 13.0 | 0.7720 |

NOTES :

1. WINDS LESS THAN 3 KNOTS.
2. SHP_A IS SHP AVAILABLE - TEST DAY
3. SHP_R IS SHP REQUIRED TO HOVER
OGE - TEST DAY
4. FOLLOWING CUT OF ONE ENGINE, THE
COLLECTIVE HELD FIXED FOR 2 SECONDS -
THEN CORRECTIVE ACTION TAKEN
5. ROTOR SPEED AT ENGINE CUT 324 RPM (100%)
6. C.G. LOCATION - 137 IN (MID)
7. SYMBOL LEGEND :

- LANDING MADE
 - GO-AROUND MADE
 - ⊙ LANDING MADE BUT COULD
POSSIBLY GO-AROUND
 - ① GO-AROUND MADE - BUT MARGINAL
- TOUCHDOWN SPEED NOTED FOR EACH
LANDING POINT

MINIMUM SINGLE SPEEDS

LEVEL FLIGHT = 25 KCAS

CLIMB = 25 KCAS

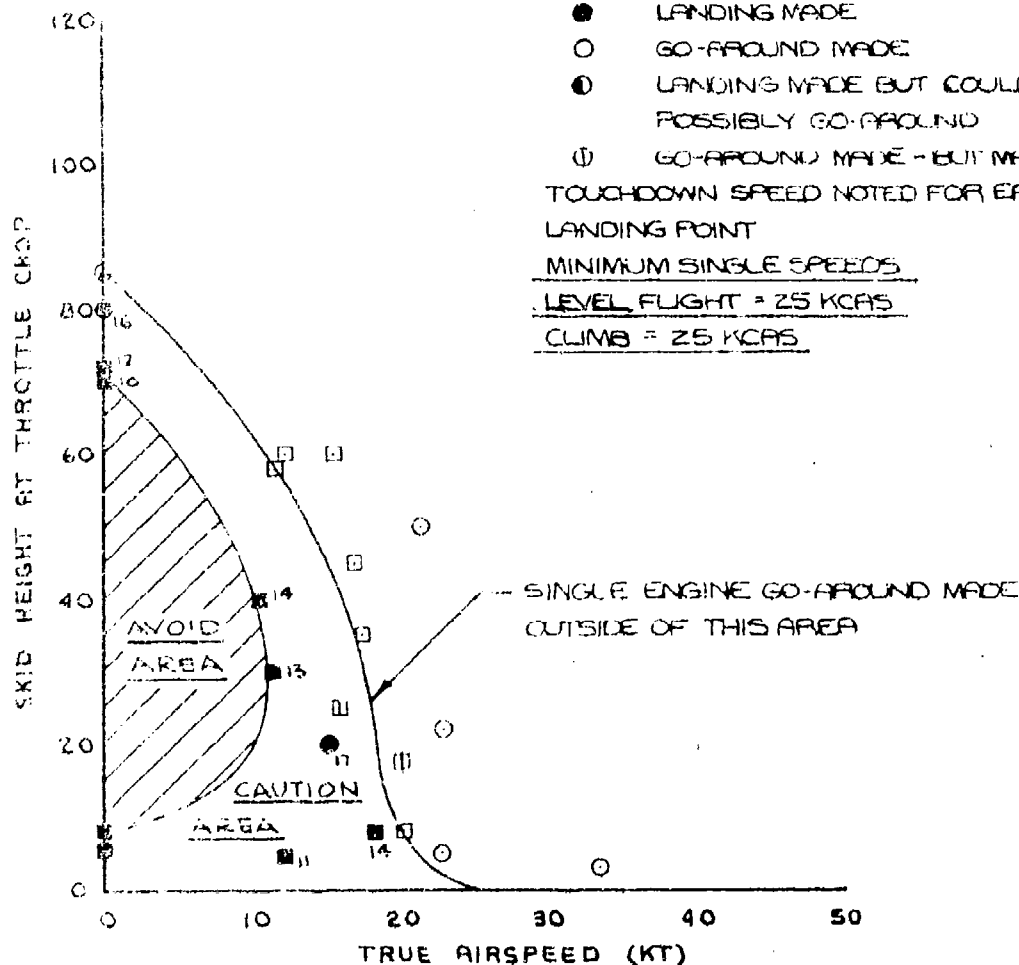


FIGURE 119 HEIGHT-VELOCITY PERFORMANCE

UH-1H USARF 5/168-10776
T400-CP-400 ENGINE
CATEGORY II

| <u>SYM</u> | <u>GROSS WT.</u> <u>(LB)</u> | <u>PRESS. ALT.</u> <u>(FT)</u> | <u>PAT</u> <u>(deg C)</u> | <u>SHPA</u> <u>SHPA</u> |
|------------|---------------------------------|-----------------------------------|------------------------------|----------------------------|
| 0 | 9510 | 3,820 | 16.0 | 0.6690 |
| □ | 9520 | 4,440 | 8.0 | 0.6518 |

NOTES :

1. WINDS LESS THAN 3 KNOTS
2. SHPA IS SHP AVAILABLE - TEST DAY
3. SHPA IS SHP REQUIRED TO HOVER CGE - TEST DAY
4. FOLLOWING CUT OF ONE ENGINE, THE COLLECTIVE HELD FIXED FOR 2 SECONDS - THEN CORRECTIVE ACTION TAKEN
5. ROTOR SPEED AT ENGINE CUT - 324 RPM (100%)
6. C.G. LOCATION - 137 IN (MID)
7. SYMBOL LEGEND :

- LANDING MADE
- GO-AROUND MADE
- ◐ LANDING MADE BUT COULD POSSIBLY GO-AROUND
- ◑ GO-AROUND MADE - BUT MARGINAL

TOUCH-DOWN SPEED NOTED FOR EACH LANDING POINT

MINIMUM SINGLE ENGINE SPEEDS

LEVEL FLIGHT = 30 KCAS

CLIMB = 36 KCAS

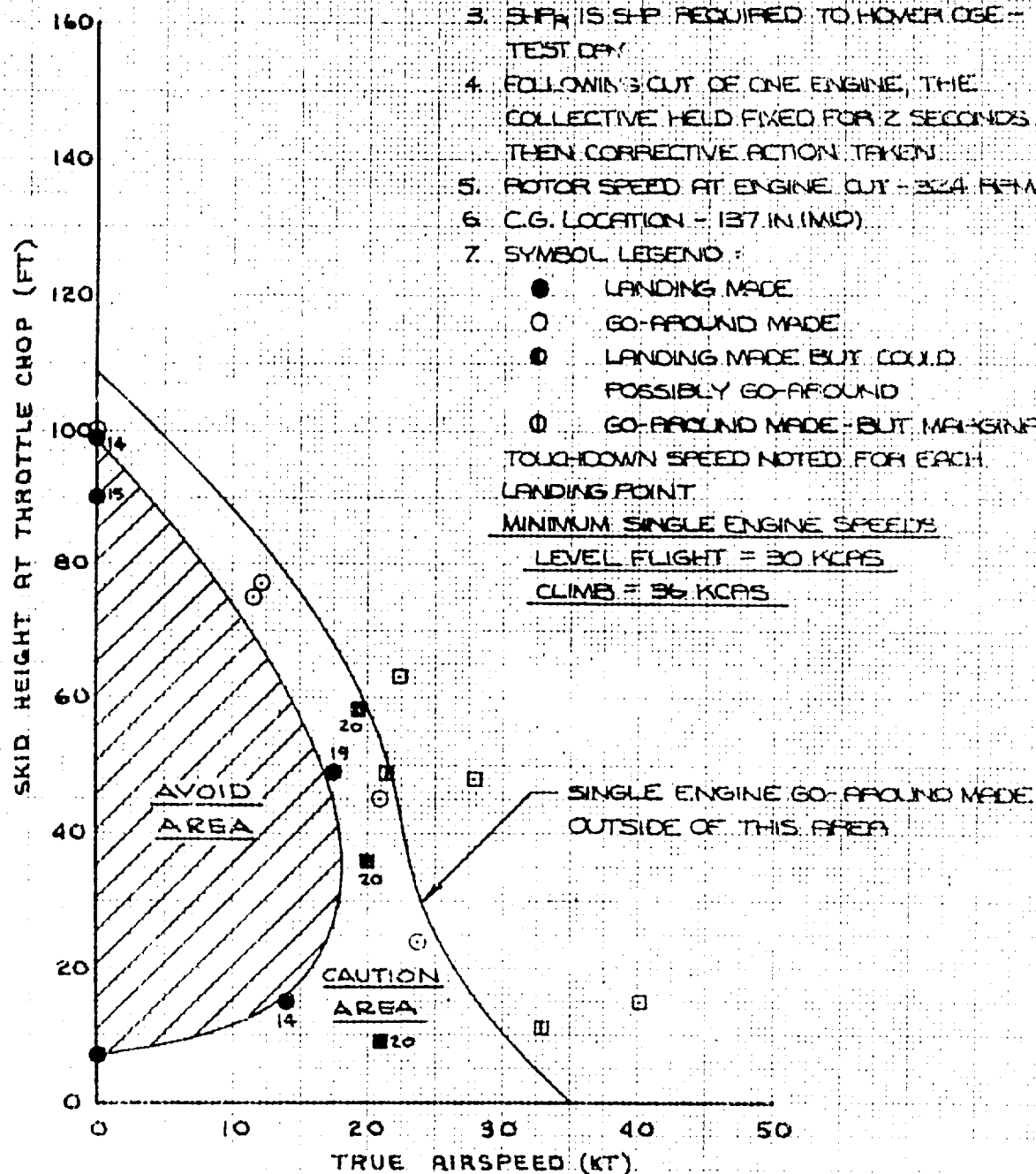


FIGURE 120 HEIGHT-VELOCITY PERFORMANCE

UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

| SYM | GROSS WT. (LB) | PRESS. ALT. (FT) | FAT (deg C) | $\frac{SHF_A}{SHF_B}$ |
|-----|-------------------|---------------------|----------------|-----------------------|
| 0 | 9990 | 3900 | 14.0 | 0.6100 |

NOTES :

1. WINDS LESS THAN 3 KNOTS
2. SHF_A IS SHP AVAILABLE - TEST DAY
3. SHF_B IS SHP REQUIRED TO HOVER - OGE - TEST DAY
4. FOLLOWING CUT OF ONE ENGINE, THE COLLECTIVE HELD FIXED FOR 2 SECONDS - THEN CORRECTIVE ACTION TAKEN
5. ROTOR SPEED AT ENGINE CUT - TEST DAY 324 RPM (100%)
6. C.G. LOCATION - 137 IN (MID)
7. SYMBOLOGY LEGEND :

- LANDING MADE
- GO-AROUND MADE
- ① LANDING MADE BUT COULD POSSIBLY GO-AROUND
- ② GO-AROUND MADE - BUT MARGINAL TOUCHDOWN SPEED NOTED FOR EACH LANDING POINT

MINIMUM SINGLE ENGINE SPEEDS

LEVEL FLIGHT = 35 KCAS

CUMBI = 41 KCAS

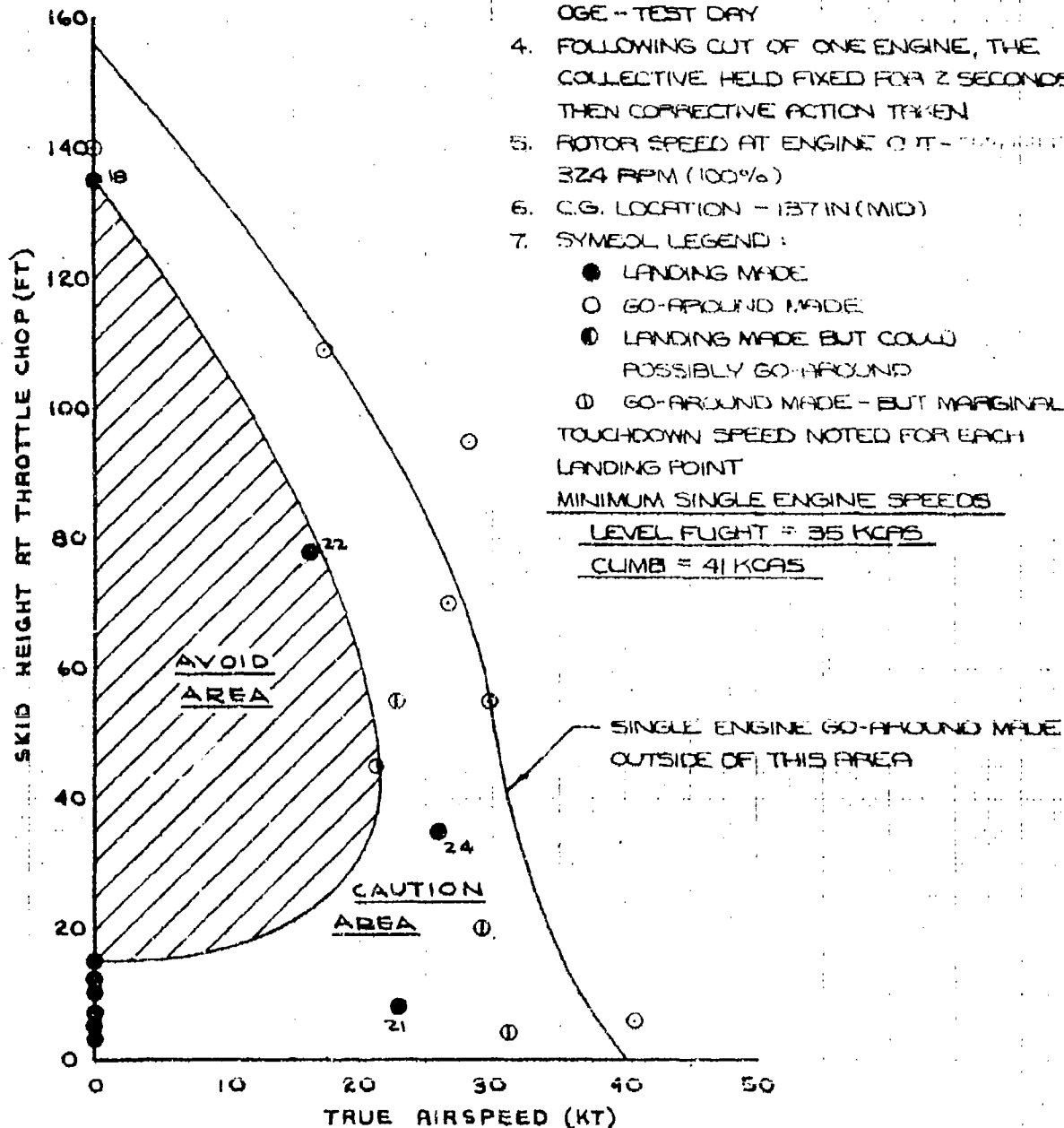


FIGURE 121 HEIGHT-VELOCITY PERFORMANCE.

UH-1H USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

| SYM | GROSS WT. (LB) | PRESS. ALT (FT) | FAT (degC) | $\frac{SHP_A}{SHP_R}$ |
|-----|-------------------|--------------------|---------------|-----------------------|
| 0 | 10500 | 3520 | 2.0 | 0.6435 |

NOTES:

1. WINDS LESS THAN 3 KNOTS
2. SHP_A IS SHP AVAILABLE - TEST DAY
3. SHP_R IS SHP REQUIRED TO HOVER OGE - TEST DAY
4. FOLLOWING OUT OF ONE ENGINE, THE COLLECTIVE HELD FIXED FOR 2 SECONDS, THEN CORRECTIVE ACTION TAKEN
5. ROTOR SPEED AT ENGINE CUT - 324 RPM (100%)
6. C.G. LOCATION - 137 IN (MID)
7. SYMBOL LEGEND:

- LANDING MADE
- GO-AROUND MADE
- ⊙ LANDING MADE BUT COULD POSSIBLY GO-AROUND
- ⊖ GO-AROUND MADE - BUT MARGINAL TOUCHDOWN SPEED NOTED FOR EACH LANDING POINT

MINIMUM SINGLE ENGINE SPEEDS

LEVEL FLIGHT = 27 KCAS

CLIMB = 32 KCAS

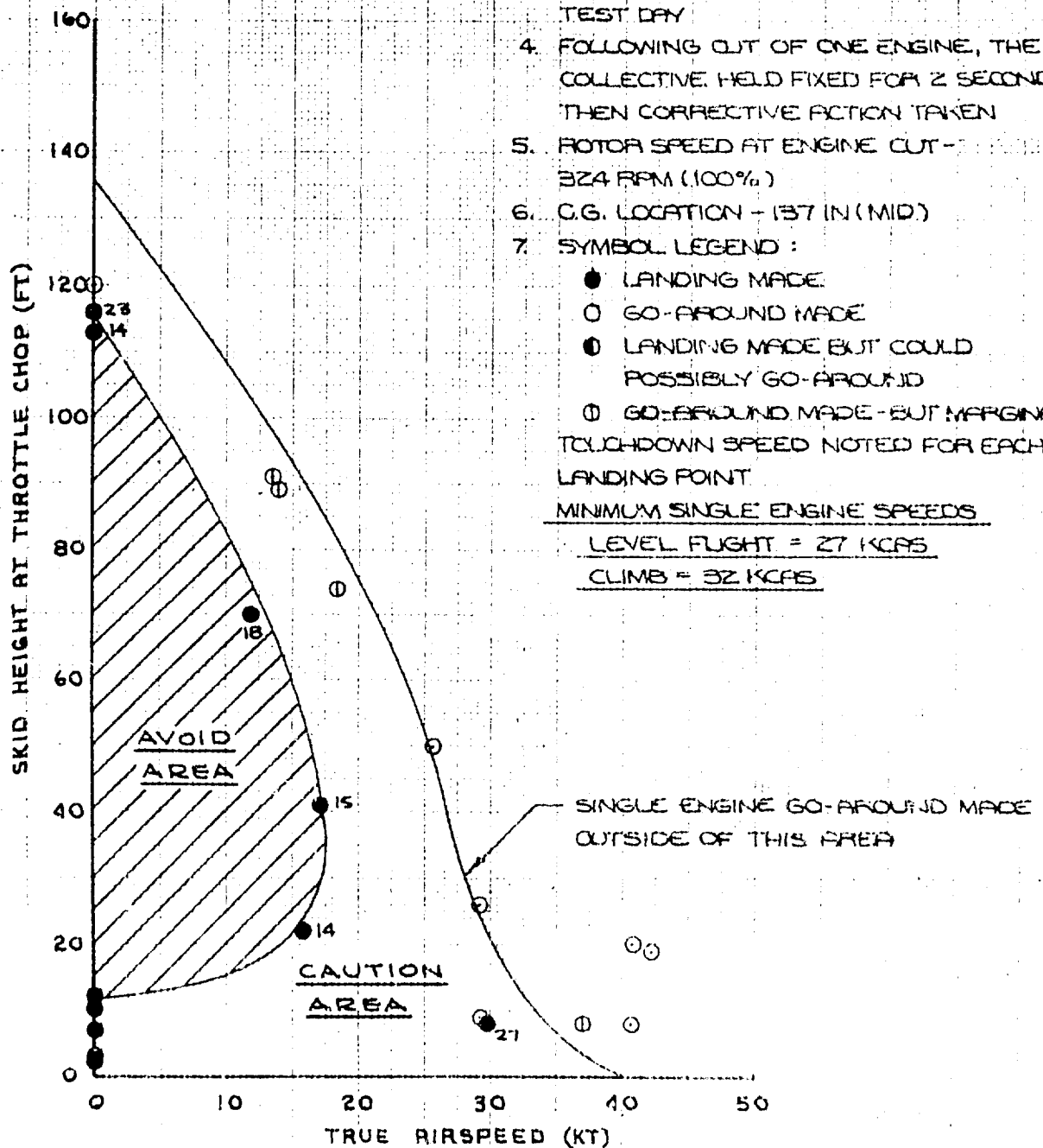


FIGURE 122 HEIGHT-VELOCITY PERFORMANCE

UH-1H USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

| Sym | GROSS WT. (LB) | PRESS. ALT. (FT) | PAT (deg C) | SHPA SHPR |
|-----|-------------------|---------------------|----------------|--------------|
| ○ | 7,610 | 9,700 | 2.0 | 0.7149 |
| □ | 7,640 | 9,360 | 6.0 | 0.7027 |
| △ | 7,700 | 9,600 | 2.0 | 0.7149 |

NOTES:

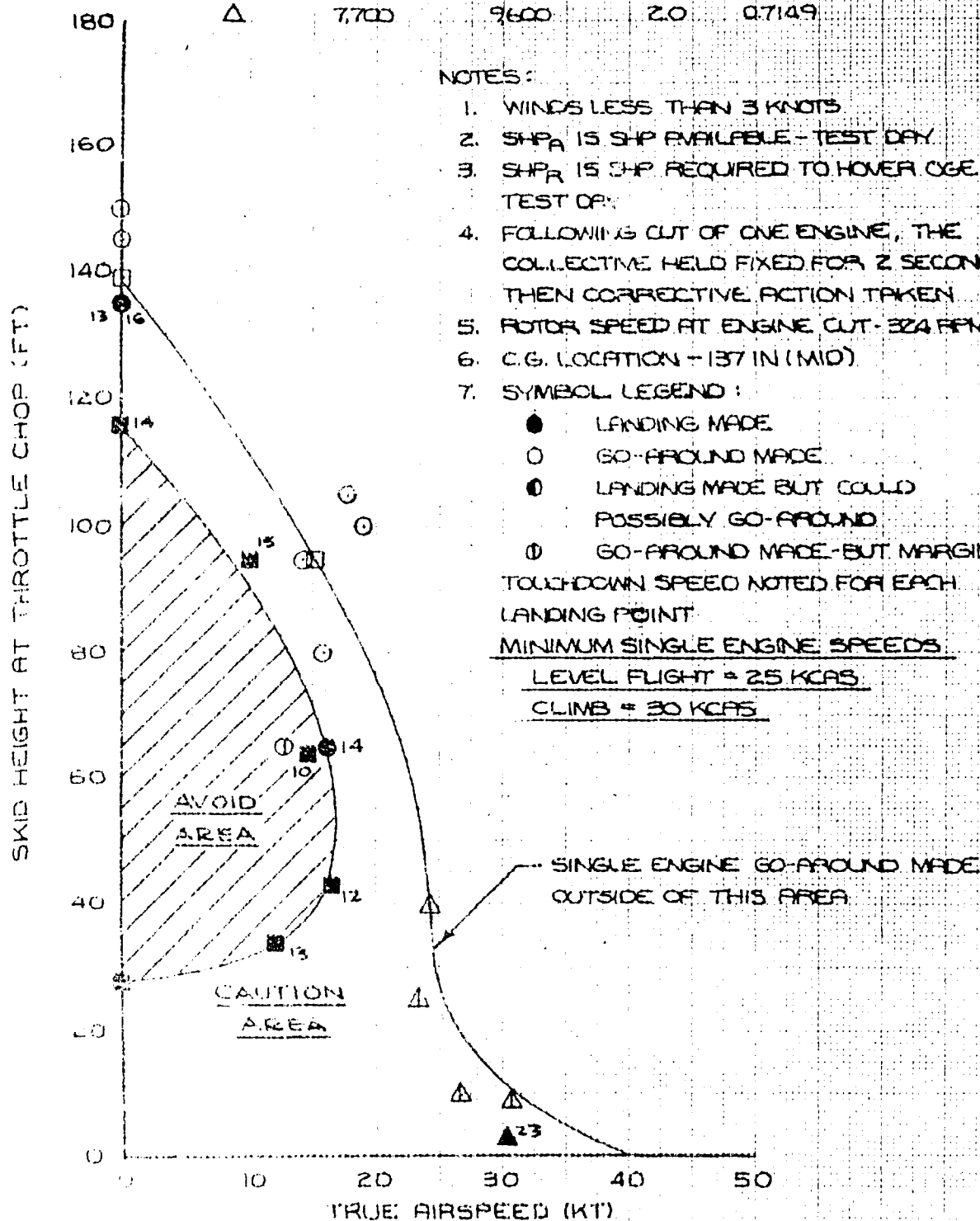
1. WINDS LESS THAN 3 KNOTS
2. SHPA IS SHP AVAILABLE - TEST DAY.
3. SHPR IS SHP REQUIRED TO HOVER CGE - TEST DAY.
4. FOLLOWING CUT OF ONE ENGINE, THE COLLECTIVE HELD FIXED FOR 2 SECONDS - THEN CORRECTIVE ACTION TAKEN
5. ROTOR SPEED AT ENGINE CUT - 324 RPM (100%)
6. C.G. LOCATION - 137 IN (MID)
7. SYMBOL LEGEND:

- LANDING MADE
- GO-AROUND MADE
- ◐ LANDING MADE BUT COULD POSSIBLY GO-AROUND
- ◑ GO-AROUND MADE-BUT MARGINAL TOUCHDOWN SPEED NOTED FOR EACH LANDING POINT

MINIMUM SINGLE ENGINE SPEEDS

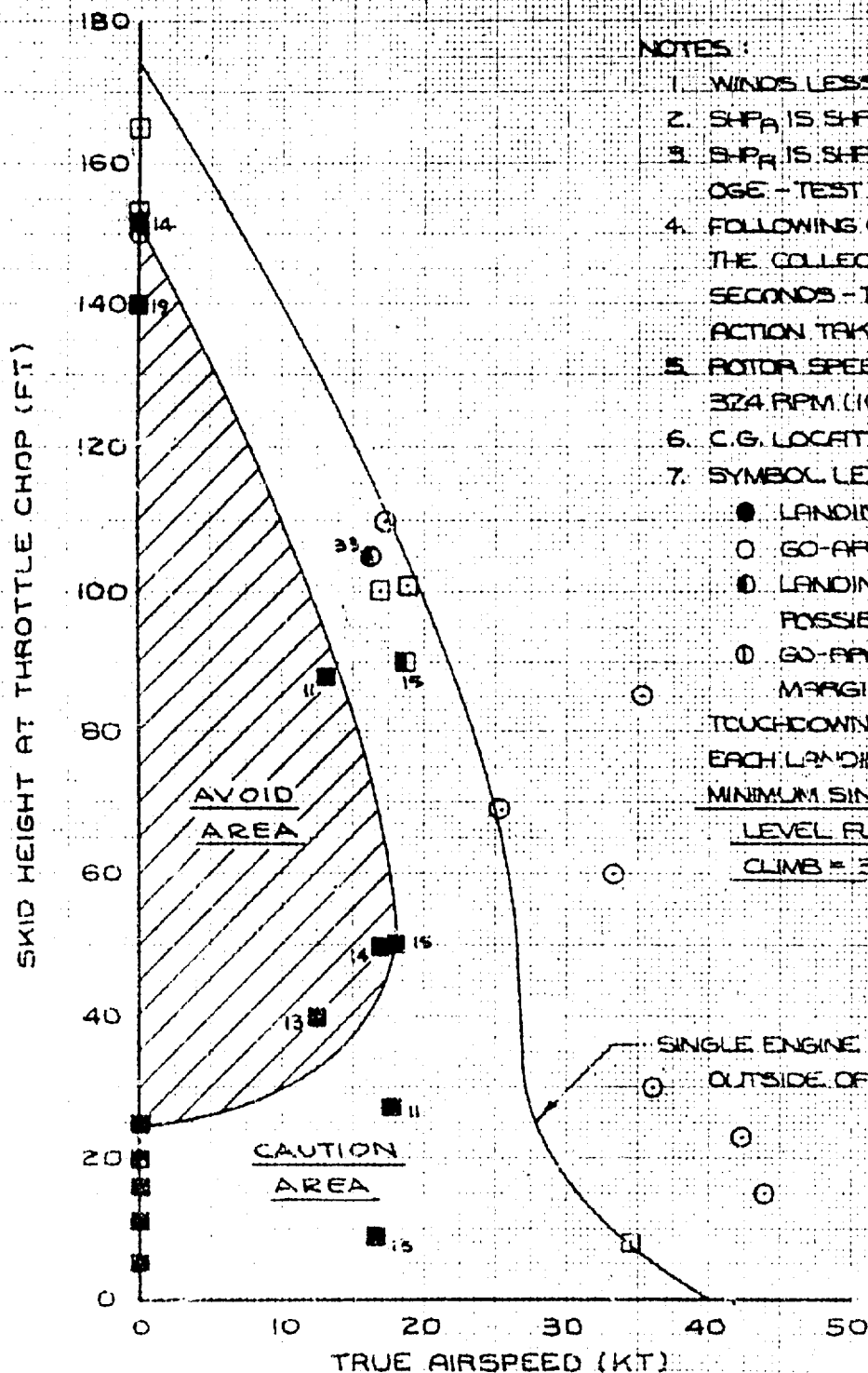
LEVEL FLIGHT = 25 KCAS

CLIMB = 30 KCAS



UH-1N USAF SIN 68-10775
T400-CP-400 ENGINE
CATEGORY II

| Sym | GROSS WT. (LB) | ENG. ALT. (FT) | FRT (deg C) | SHP _A SHP _R |
|-----|-------------------|-------------------|----------------|--------------------------------------|
| ○ | 8470 | 9600 | 30 | 0.6312 |
| □ | 8450 | 9590 | 30 | 0.6170 |



NOTES:

1. WINDS LESS THAN 3 KNOTS
2. SHP_A IS SHP AVAILABLE - TEST DAY
3. SHP_R IS SHP REQUIRED TO HOVER OGE - TEST DAY
4. FOLLOWING OUT OF ONE ENGINE, THE COLLECTIVE HELD FIXED FOR 2 SECONDS - THEN CORRECTIVE ACTION TAKEN
5. ROTOR SPEED (AT ENGINE CUT-324 RPM (100%))
6. C.G. LOCATION - 137 IN (MID)
7. SYMBOL LEGEND

- LANDING MADE
- GO-AROUND MADE
- ◐ LANDING MADE BUT COULD POSSIBLY GO-AROUND
- ◑ GO-AROUND MADE - BUT MARGINAL

TOUCHDOWN SPEED NOTED FOR EACH LANDING POINT

MINIMUM SINGLE ENGINE SPEEDS

LEVEL FLIGHT = 30 KCAS

CLIMB = 36 KCAS

FIGURE 124 HEIGHT VELOCITY PERFORMANCE

UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

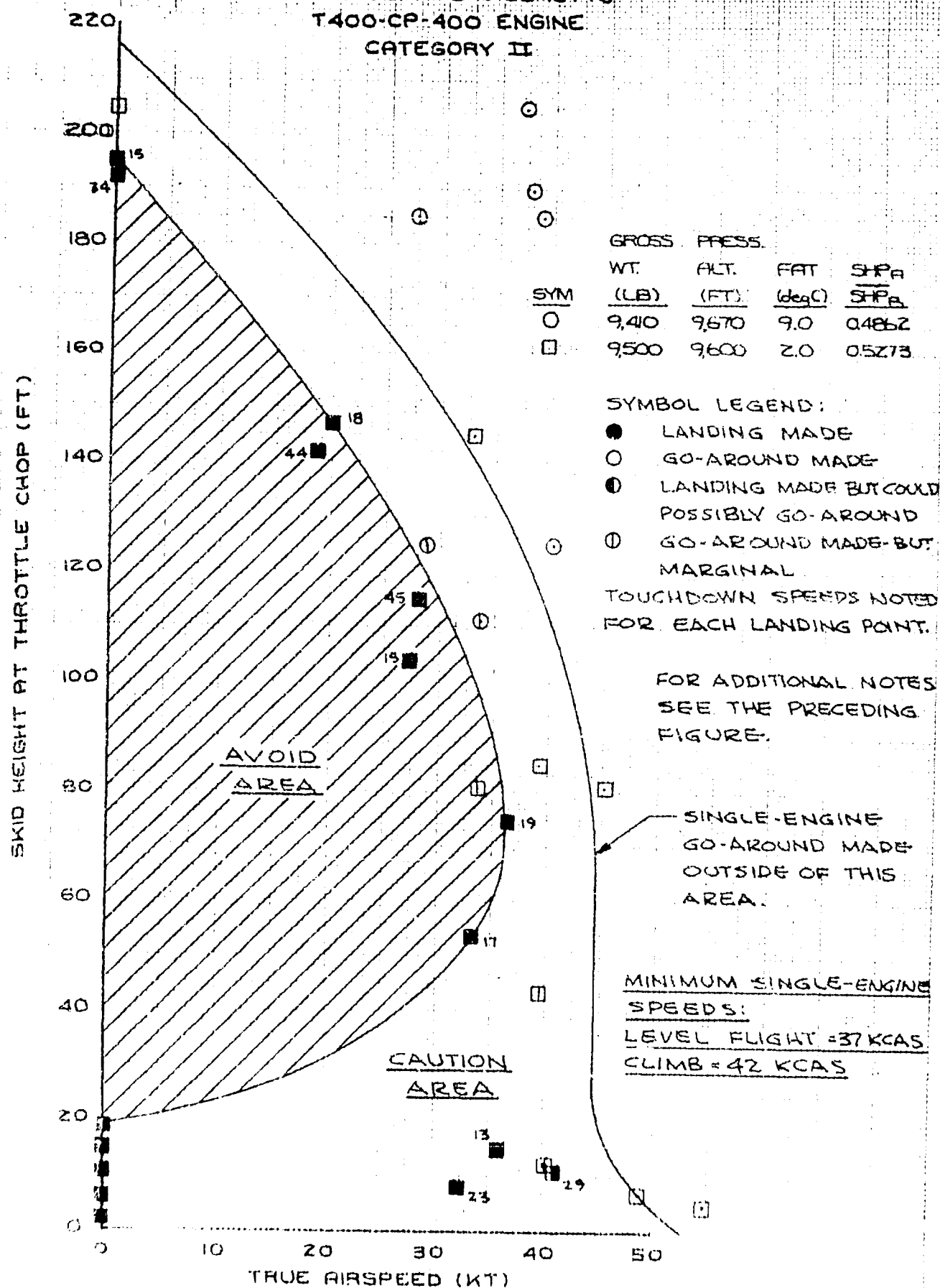
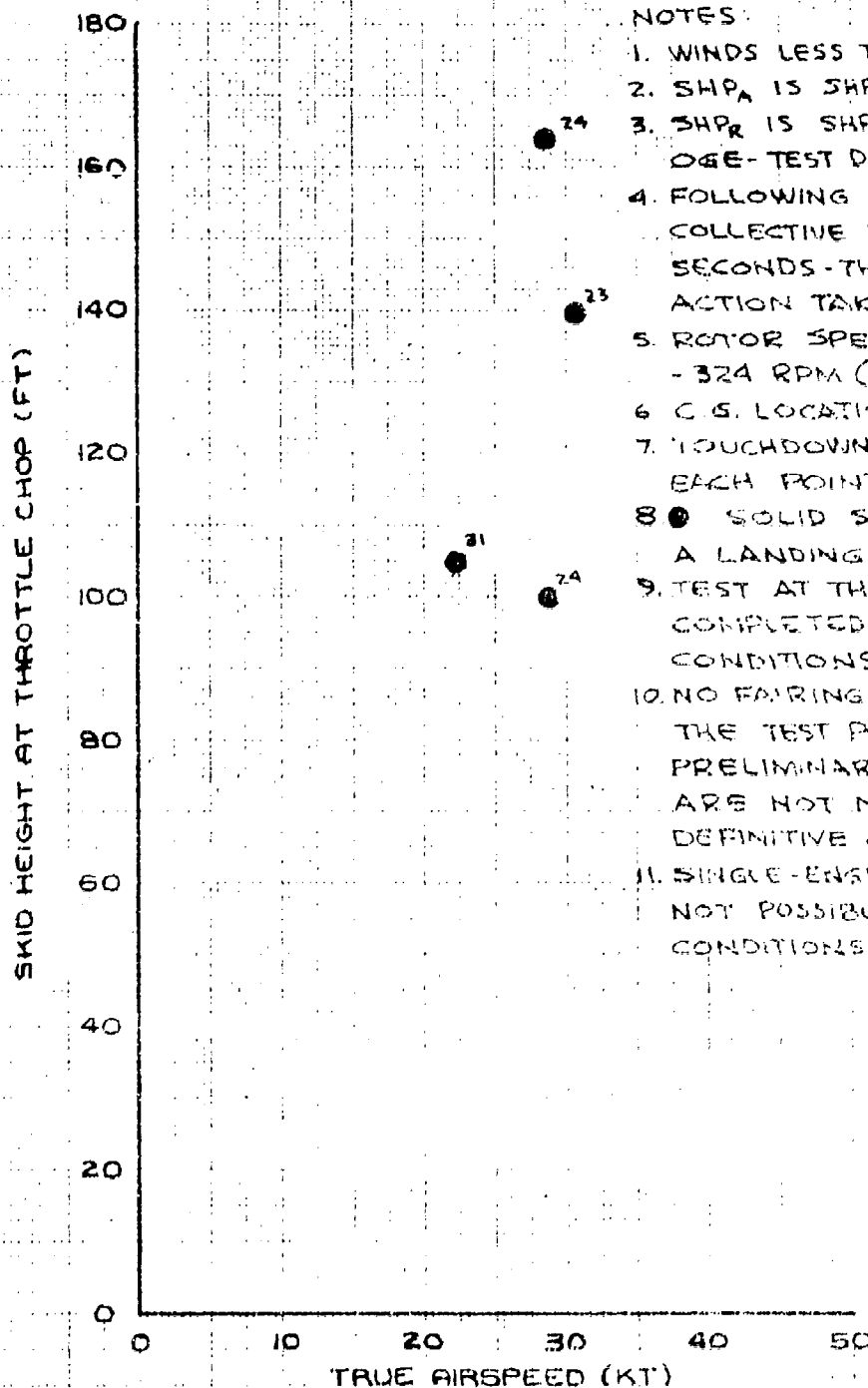


FIGURE 25 HEIGHT VELOCITY PERFORMANCE

UH-1H USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

| <u>SYM</u> | <u>GROSS WT.</u> <u>(LB)</u> | <u>PRESS. ALT.</u> <u>(FT)</u> | <u>FFAT</u> <u>(deg C)</u> | <u>SHP_A</u> <u>SHP_R</u> |
|------------|---------------------------------|-----------------------------------|-------------------------------|--|
| 0 | 10440 | 9680 | 0.0 | 04424 |



NOTES:

1. WINDS LESS THAN 3 KNOTS.
2. SHP_A IS SHP AVAILABLE TEST DAY.
3. SHP_R IS SHP REQUIRED TO HOVER OGE- TEST DAY.
4. FOLLOWING CUT OF ONE ENGINE, COLLECTIVE HELD FIXED FOR 2- SECONDS - THEN CORRECTIVE ACTION TAKEN.
5. ROTOR SPEED AT ENGINE CUT - 324 RPM (100 PCT).
6. C.G. LOCATION - 137 IN (MID).
7. TOUCHDOWN SPEED NOTED FOR EACH POINT.
8. ● SOLID SYMBOLS INDICATE A LANDING MADE.
9. TEST AT THIS CONDITION NOT COMPLETED DUE TO WEATHER CONDITIONS.
10. NO FAIRING PRESENTED SINCE THE TEST POINTS WERE FOR PRELIMINARY WORK UP AND ARE NOT NECESSARILY DEFINITIVE AS MINIMUM POINTS.
11. SINGLE-ENGINE LEVEL FLIGHT NOT POSSIBLE AT THE TEST CONDITIONS.

FIGURE 126. HEIGHT VELOCITY PERFORMANCE

UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

TWIN ENGINE OPERATION

NOTES:

1. GEARBOX S/N 4064
LEFT ENGINE S/N 66127
RIGHT ENGINE S/N 66128
2. SOLID SYMBOLS INDICATE BLEED AIR HEAT ON
3. DASHED LINES INDICATE UACL
CALIBRATION 17 SEP 70
4. TAILED SYMBOLS INDICATE
LEFT ENGINE
5. 100% N_g IS 33,180

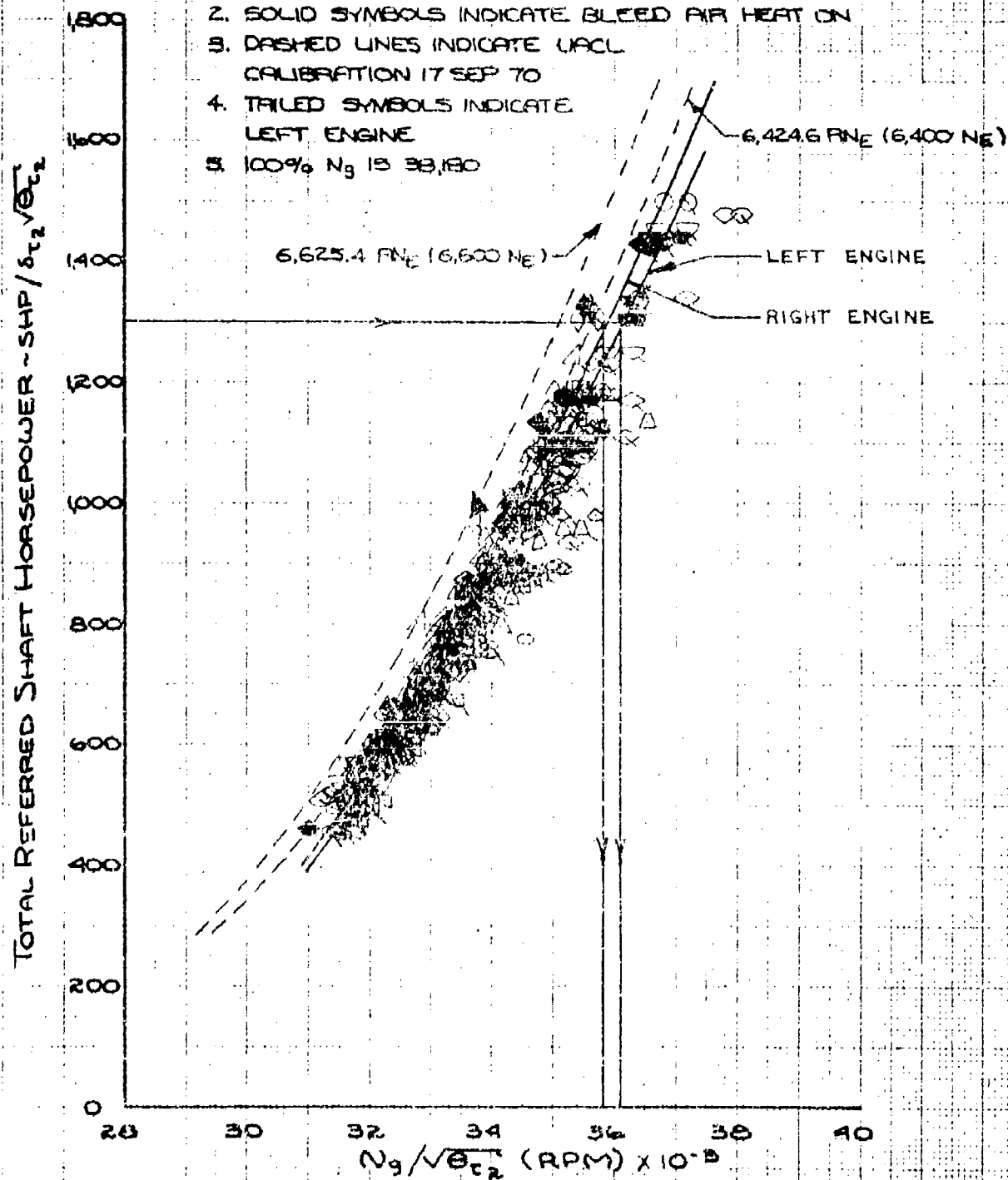


FIGURE 127 ENGINE CHARACTERISTICS

UH-1N USAF S/N 68-10716
T400-CP-400 ENGINE
CATEGORY II

TWIN ENGINE OPERATION

NOTES:

1. GEARBOX S/N 4064
2. SOLID SYMBOLS INDICATE BLEED AIR HEAT ON.
3. DASHED LINES INDICATE UACL CALIBRATION 17 SEP 70

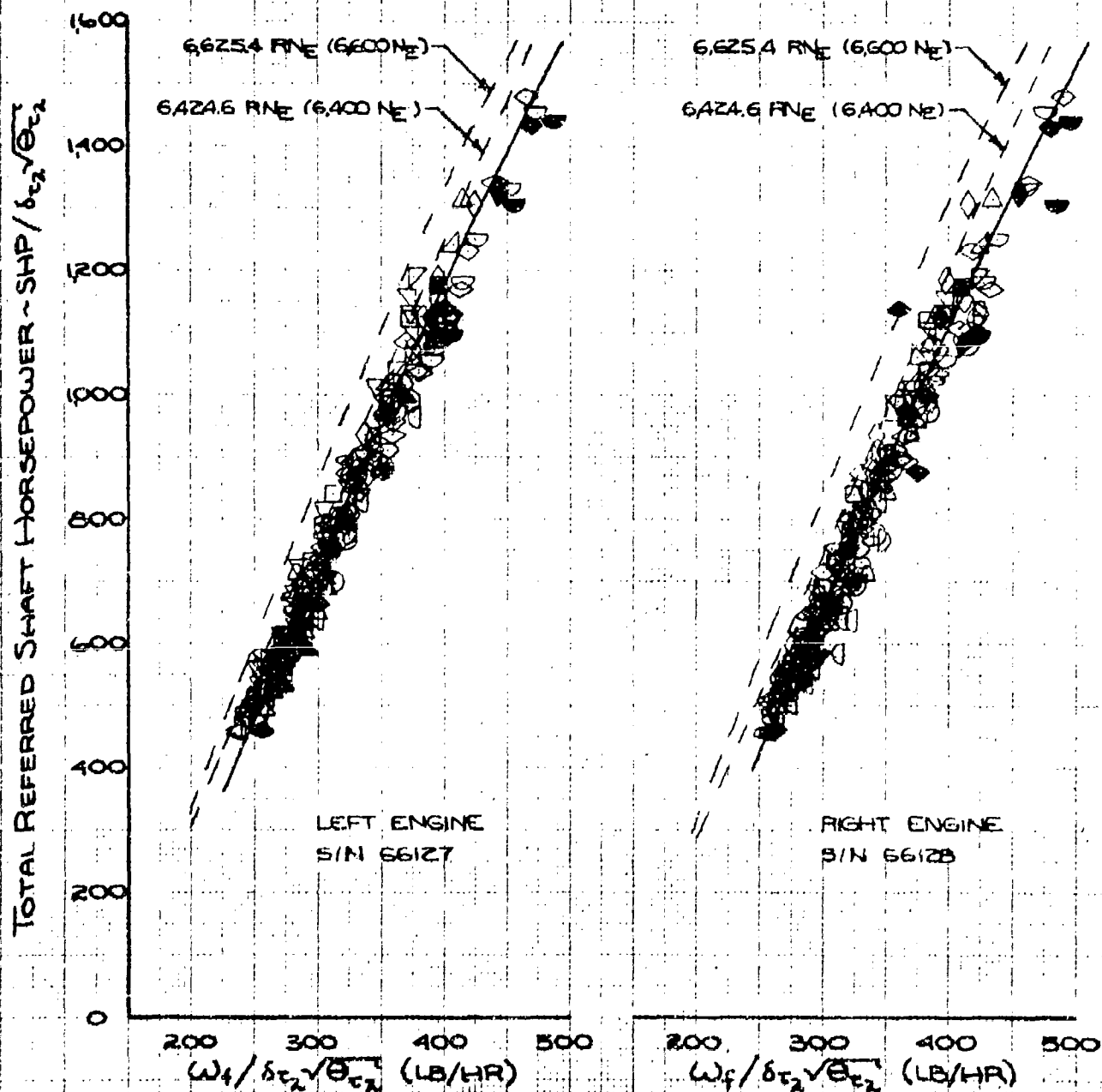


FIGURE 128 ENGINE CHARACTERISTICS

UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

TWIN ENGINE OPERATION

NOTES:

1. GEARBOX S/N 4064
2. SOLID SYMBOLS INDICATE BLEED AIR ON.
3. DASHED LINES INDICATE UACL CALIBRATION 17 SEP 70.

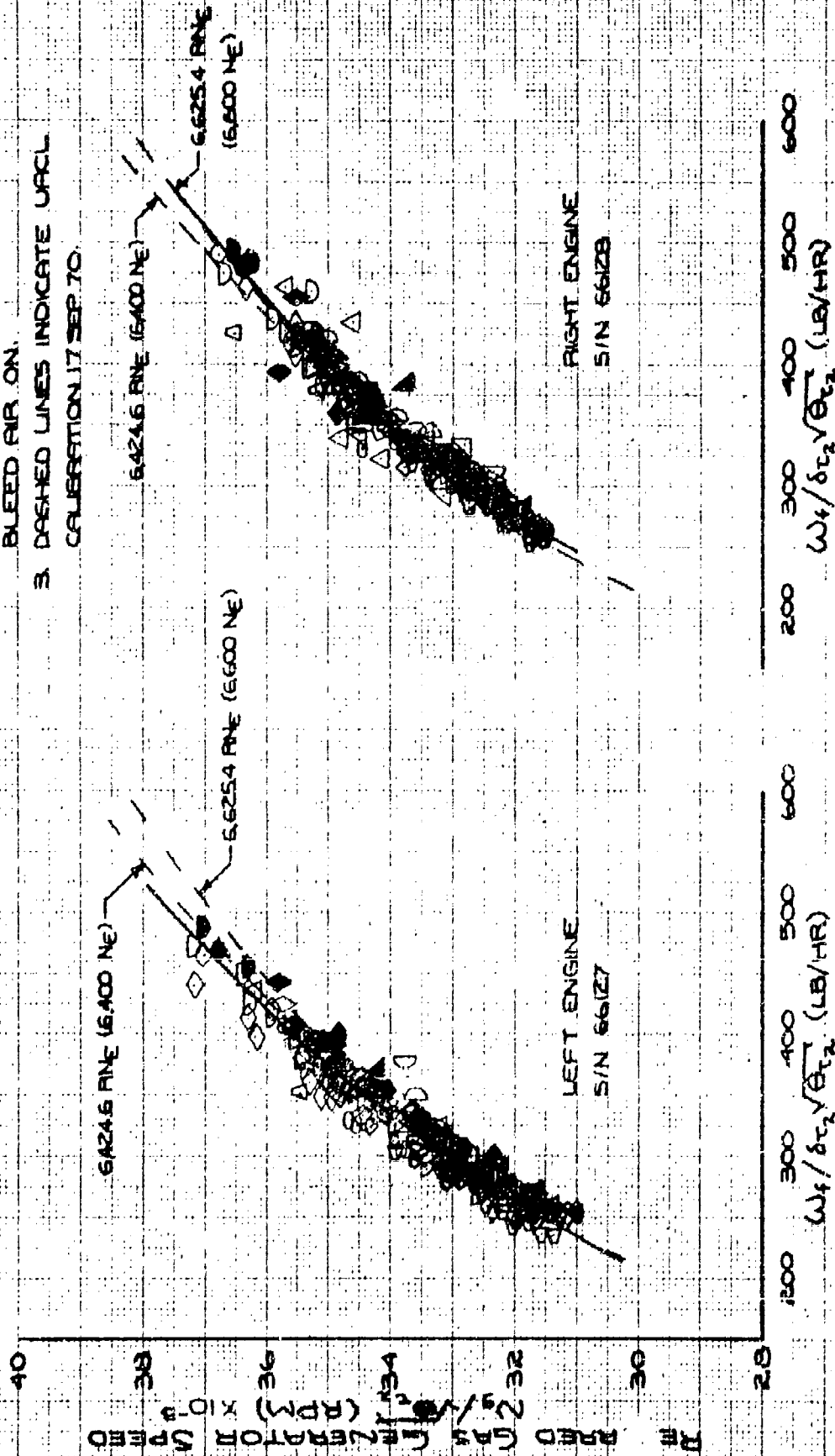


FIGURE 129 ENGINE CHARACTERISTICS

UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

TWIN ENGINE OPERATION

NOTES:

1. GEARBOX S/N 4064
2. SOLID SYMBOLS INDICATE BLEED AIR HEAT ON
3. DASHED LINES INDICATE UACL CALIBRATION 17 SEP 70.
4. 100% N_3 IS 36,180 RPM.

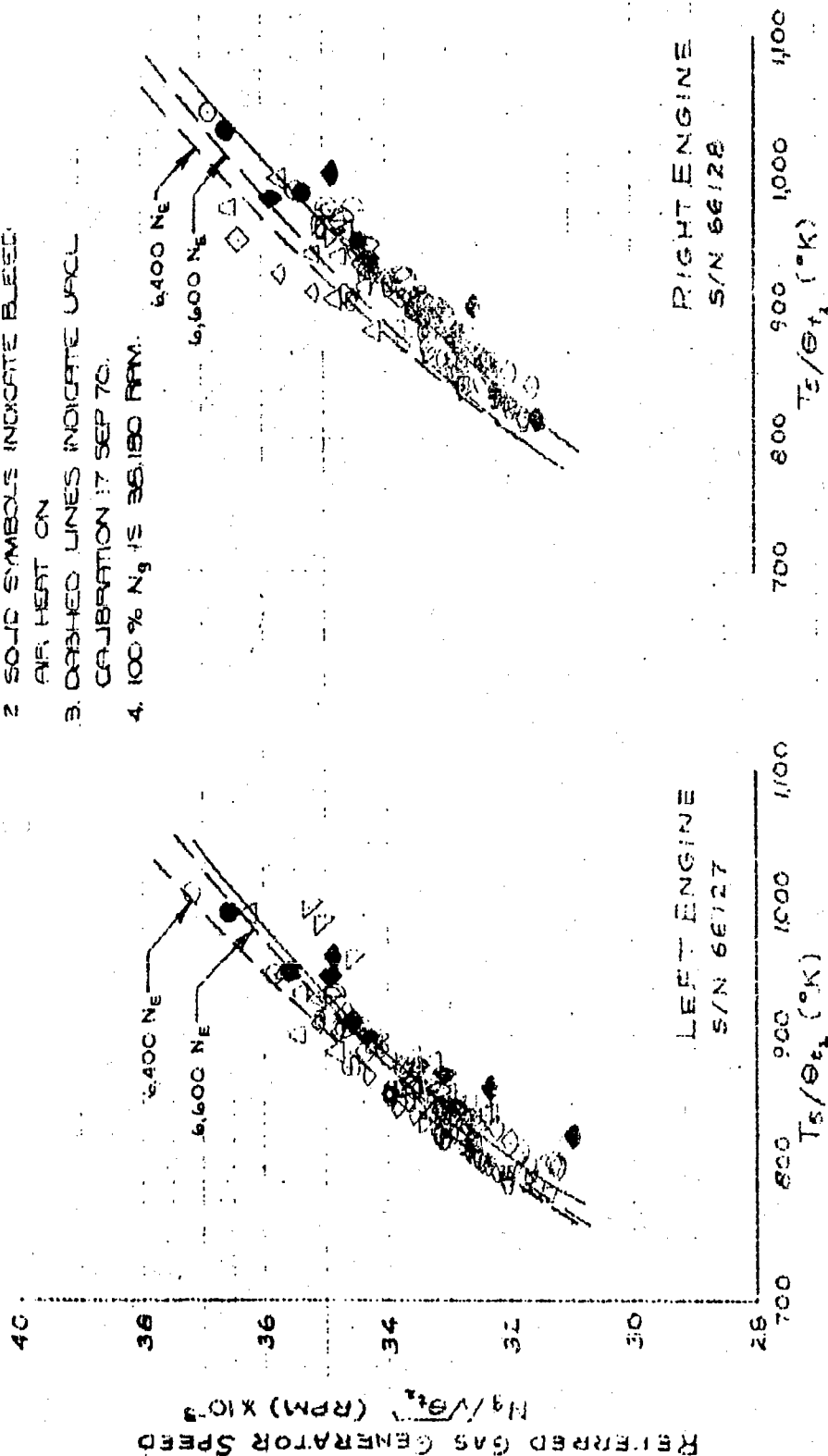


FIGURE 150 ENGINE CHARACTERISTICS

UH-1H USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

SINGLE ENGINE OPERATION

NOTES:

1. GEARBOX S/N 4064
2. SOLID SYMBOLS INDICATE SINGLE ENGINE TOPPING POWER
3. 100% N_g IS 38,180 RPM
4. DASHED LINE INDICATES UACL CALIBRATION 17 SEP 70

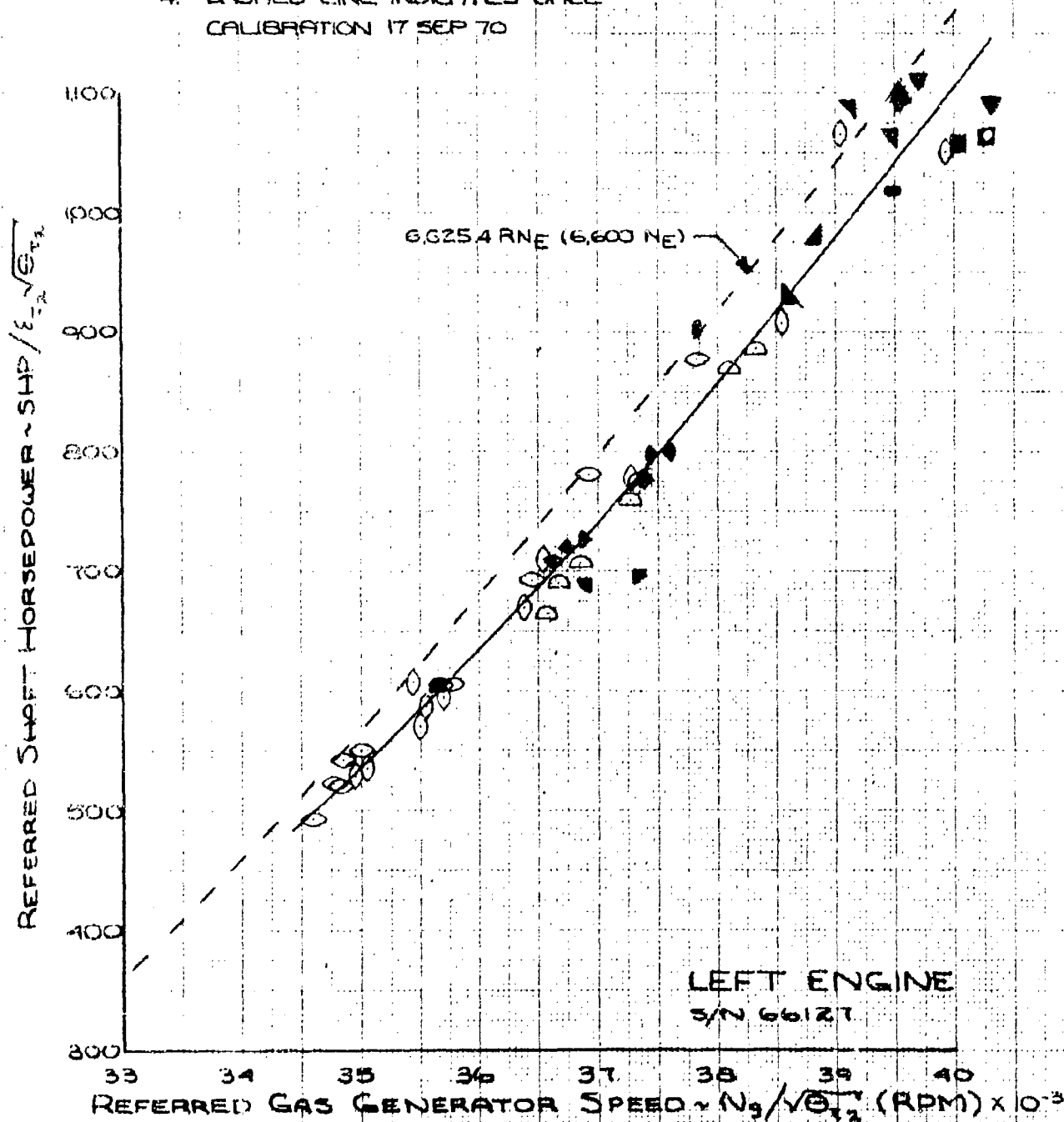


FIGURE 131 ENGINE CHARACTERISTICS

UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

SINGLE ENGINE OPERATION

NOTES:

1. GEARBOX S/N 4044
2. STAR SYMBOLS INDICATE SINGLE
ENGINE TOPPING POWER
3. DASHED LINE INDICATES UNCL
CALCULATED 17 SEP 70

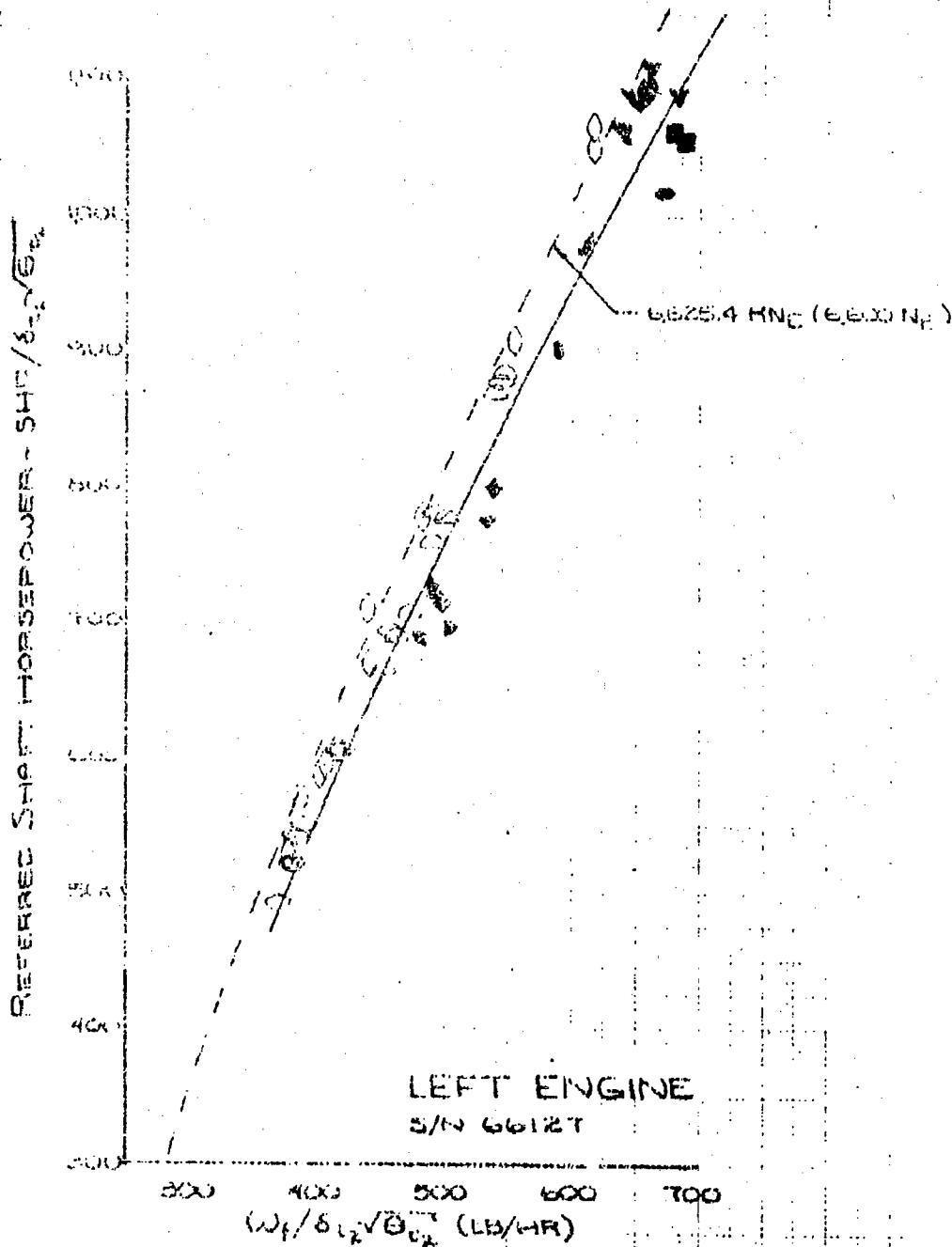


FIGURE 1B2. ENGINE CHARACTERISTICS

UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

SINGLE ENGINE OPERATION

NOTES:

1. GEARBOX S/N 4064
2. SOLID SYMBOLS INDICATE SINGLE ENGINE TOPPING POWER
3. 100% N_g IS 38,180 RPM
4. DASHED LINE INDICATES URCL CALIBRATION 17 SEP 70

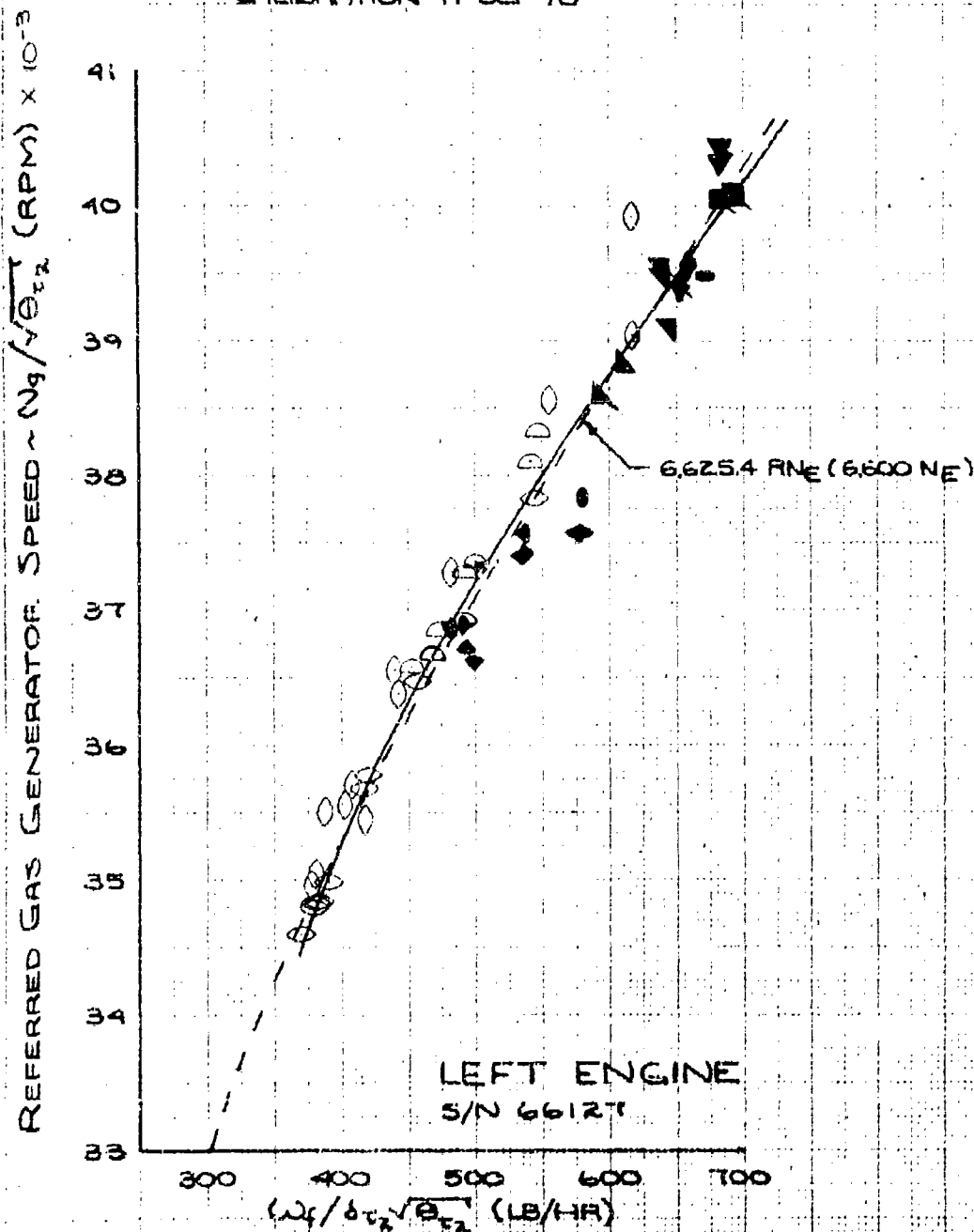


FIGURE 135 ENGINE CHARACTERISTICS

UH-1H USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

SINGLE ENGINE OPERATION
NOTES:

1. GEARBOX S/N 4064
2. SOLID SYMBOLS INDICATE SINGLE ENGINE TOPPING POWER
3. 100% N_g IS 38,180 RPM
4. DASHED LINE INDICATES UACI CALIBRATION 17 SEP 70

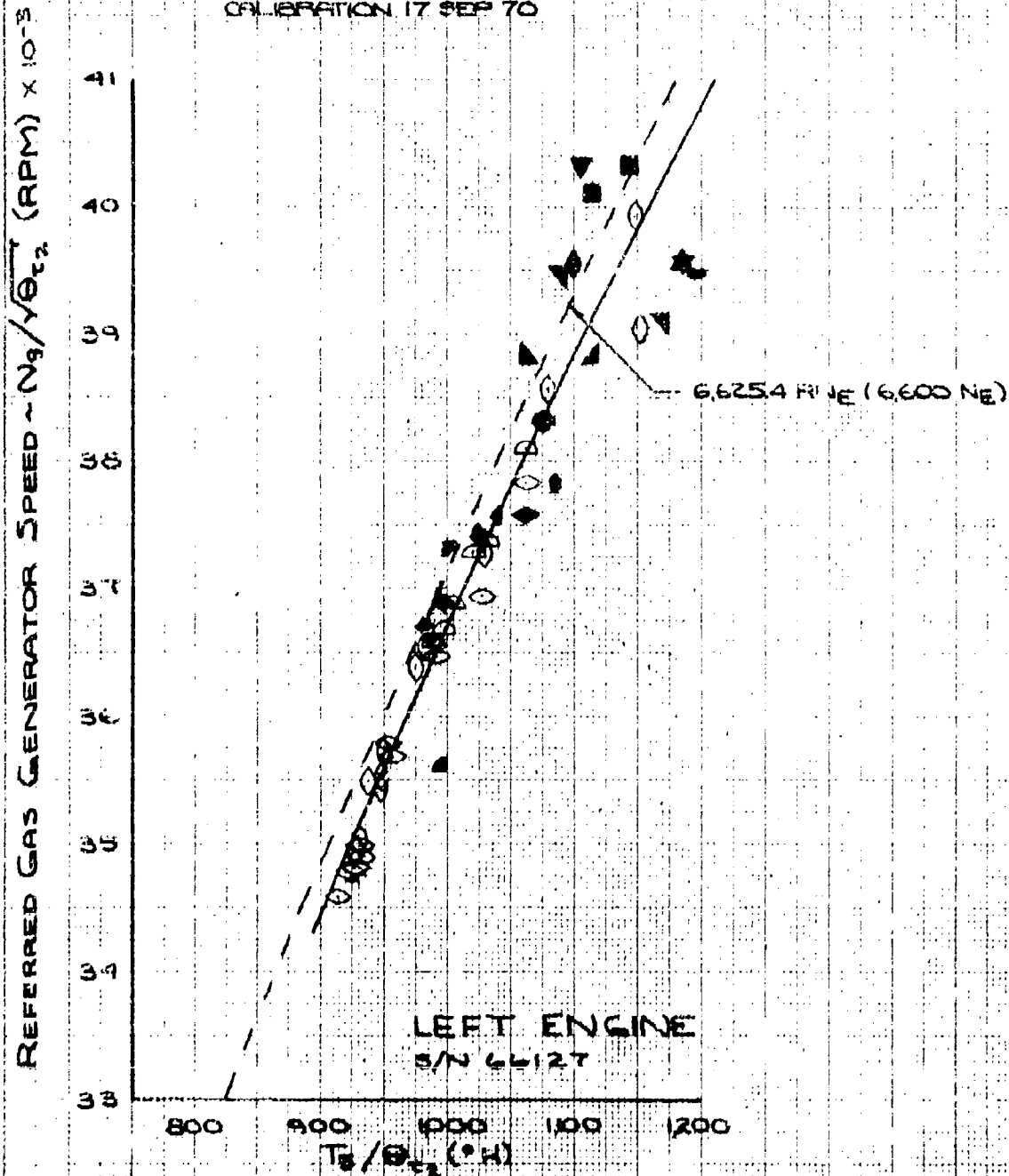


FIGURE 154 ENGINE CHARACTERISTICS

UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

SINGLE ENGINE OPERATION

NOTES:

1. GEARBOX S/N 4064
2. SOLID SYMBOLS INDICATE SINGLE ENGINE TOPPING POWER
3. 100% N_2 IS 36,120 RPM
4. DASHED LINE INDICATES UACL CALIBRATION 17 SEP 70

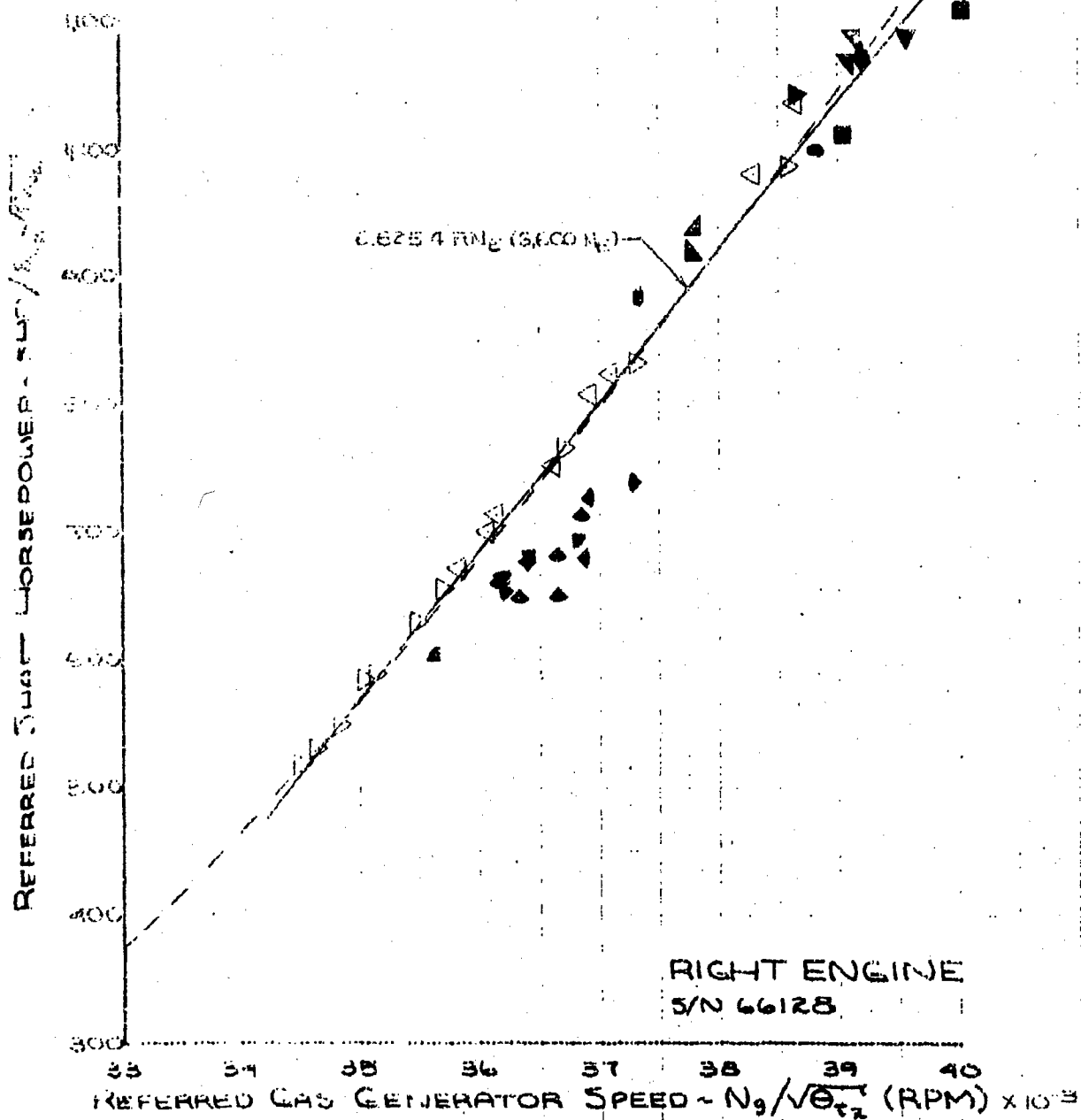


FIGURE 135 ENGINE CHARACTERISTICS

U14-IN USAF S/N 68-10TT6
T400-CP-400 ENGINE
CATEGORY II

SINGLE ENGINE OPERATION

NOTES :

1. GEARBOX S/N 4064
2. SOLID SYMBOLS INDICATE SINGLE ENGINE TOPPING POWER
3. DASHED LINE INDICATES UACL CALIBRATION 17 SEP 70

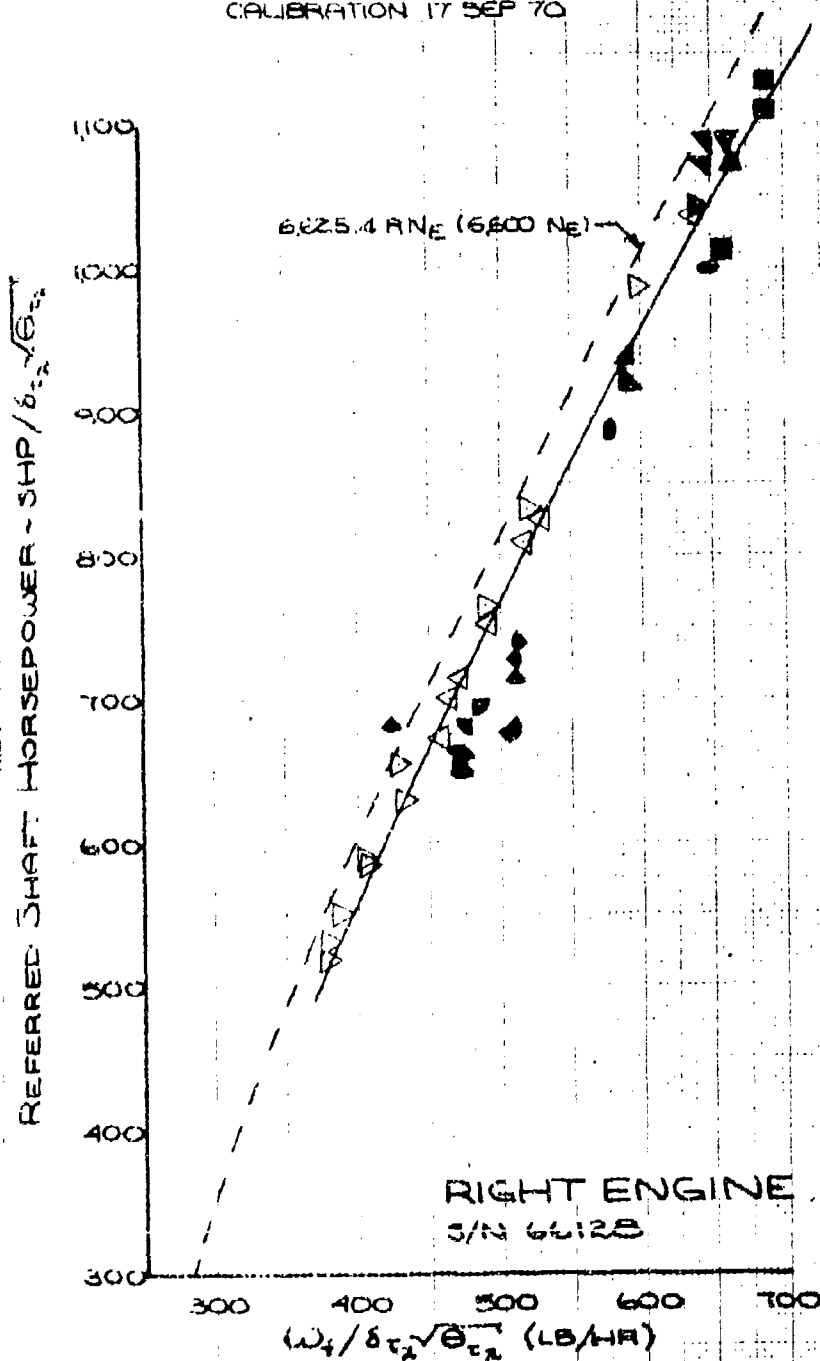


FIGURE 136 ENGINE CHARACTERISTICS

UH-1H USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

SINGLE ENGINE OPERATION

NOTES:

1. GEARBOX S/N 4024
2. SOLID SYMBOLS INDICATE SINGLE ENGINE TOWING POWER
3. 100% N_3 IS 38,120 RPM
4. DASHED LINE INDICATES HULL CALIBRATION 17-SEP-70

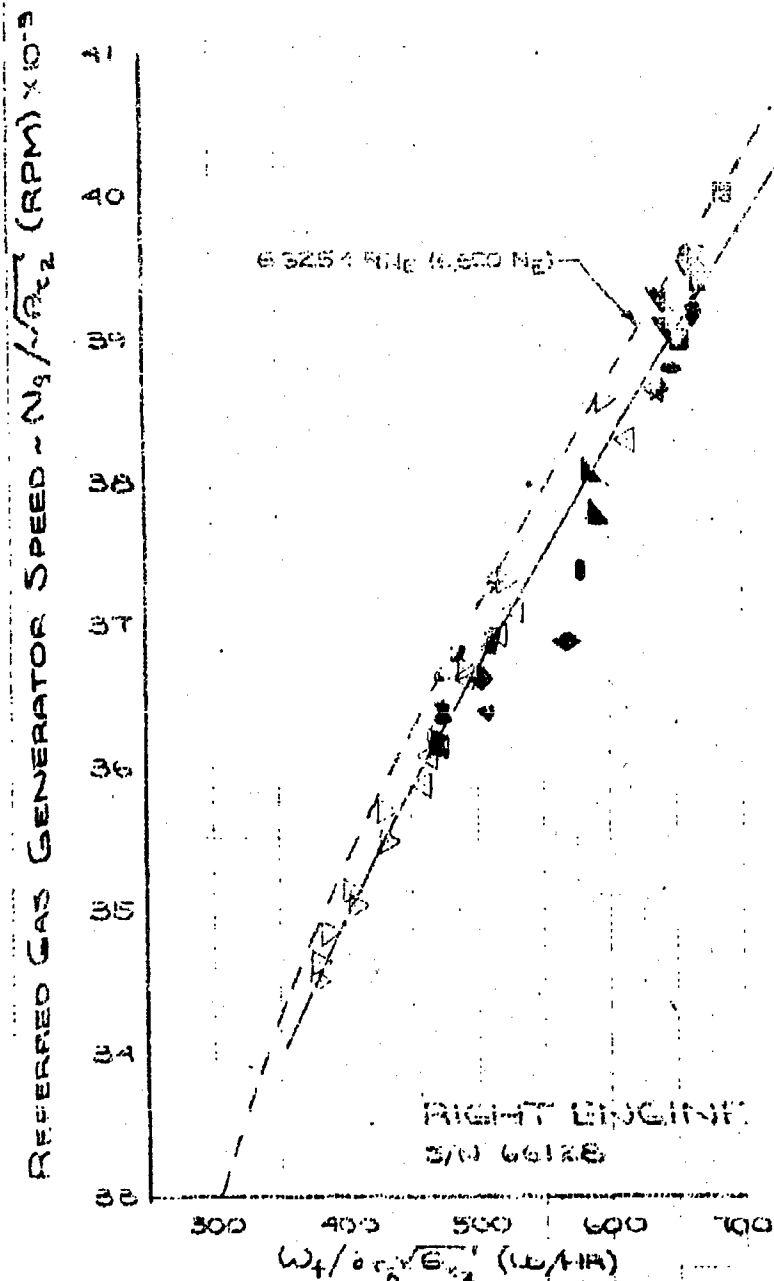


FIGURE 127. ENGINE CHARACTERISTICS

UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

SINGLE ENGINE OPERATION

NOTES:

1. GEARBOX S/N 4064
2. SOLID SYMBOLS INDICATE SINGLE ENGINE TOPPING POWER
3. 100% N_g IS 38,180 RPM
4. DASHED LINE INDICATES WACL CALIBRATION 17 SEP 70

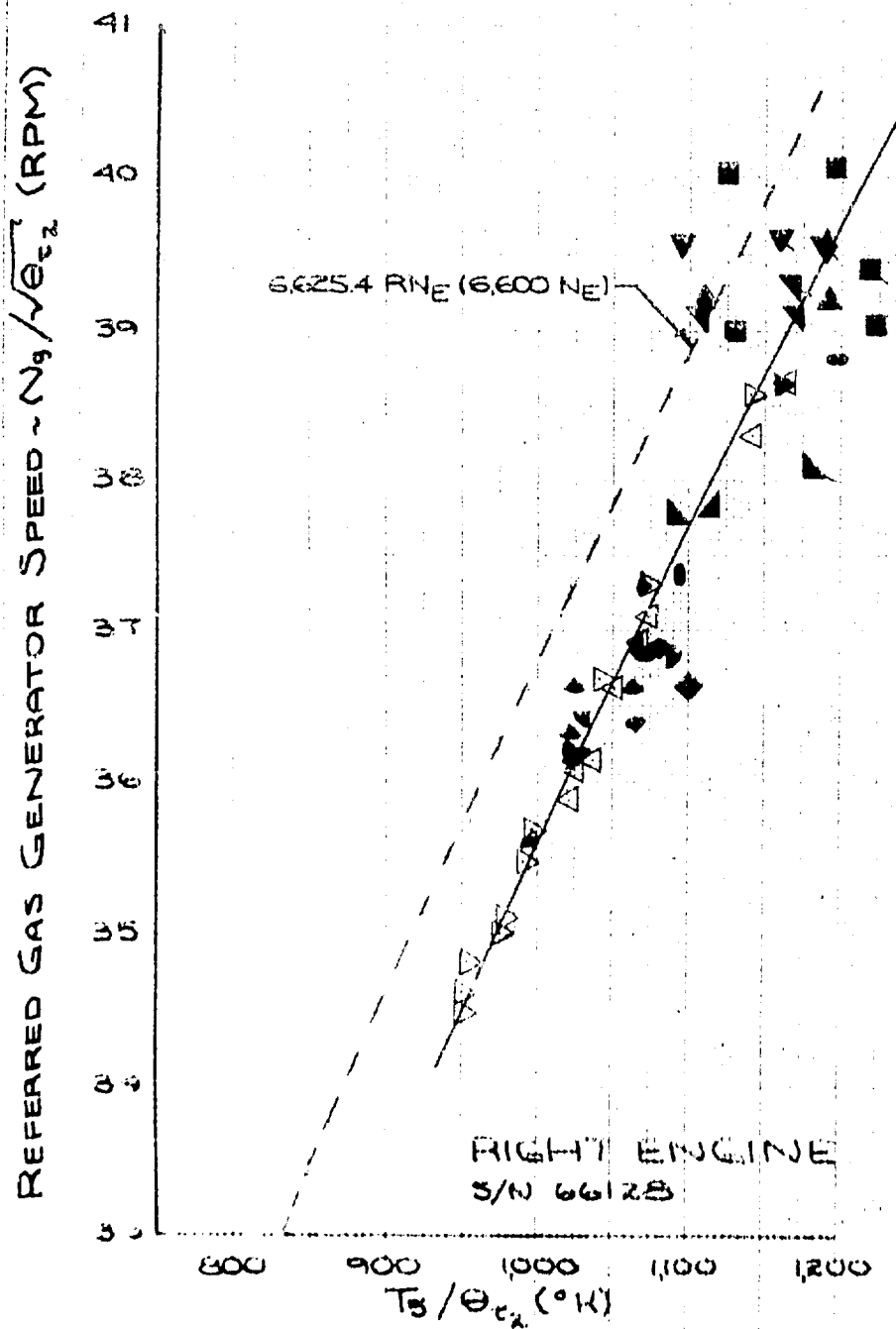


FIGURE 130 ENGINE CHARACTERISTICS

UH-1H USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

TWIN ENGINE OPERATION

NOTES:

1. GEARBOX S/N 4064
2. DATA OBTAINED IN LEVEL FLIGHT
3. SOLID SYMBOLS DENOTE BLEED AIR FOR HEAT ON

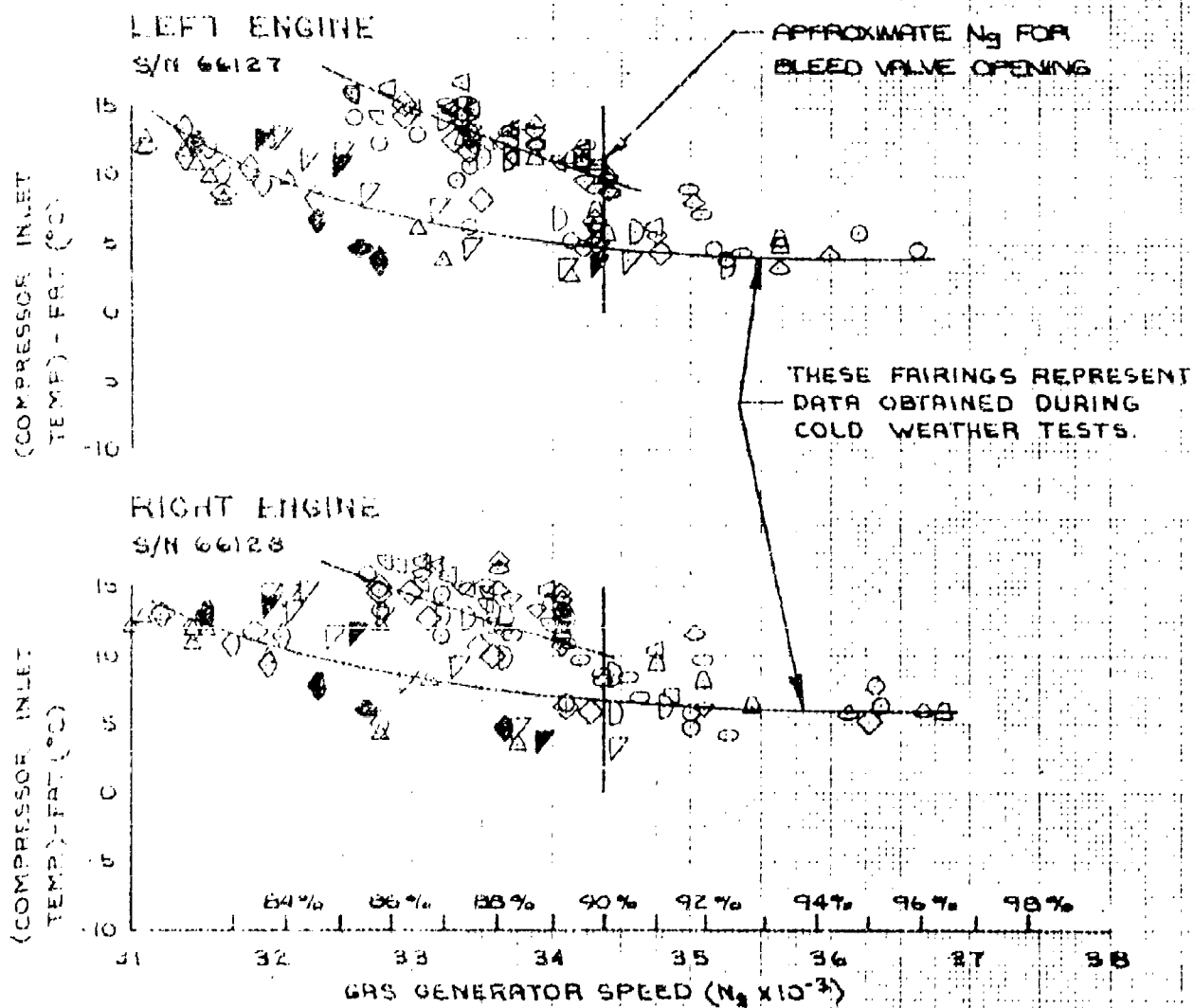


FIGURE 139 ENGINE INLET CHARACTERISTICS

UH-1H USAF S/N 68-10776

T400-CP-400 ENGINE

CATEGORY II

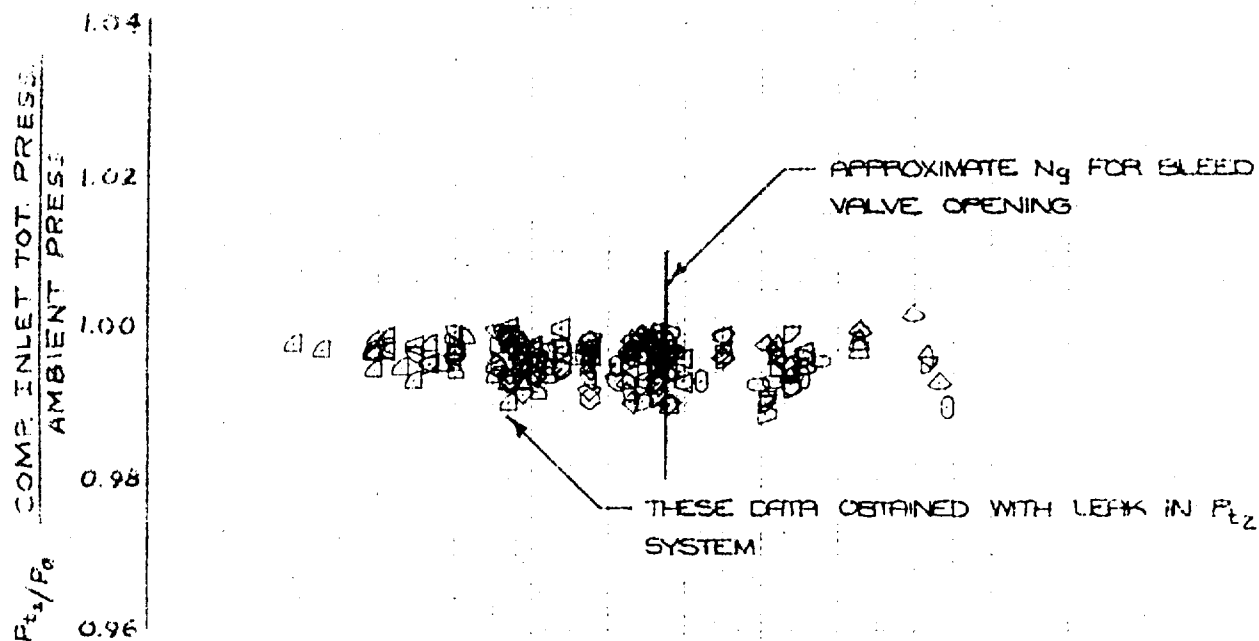
TWIN ENGINE OPERATION

NOTES:

1. GEARBOX S/N 4064
2. DATA OBTAINED IN LEVEL FLIGHT

LEFT ENGINE

S/N 66127



RIGHT ENGINE

S/N 66128

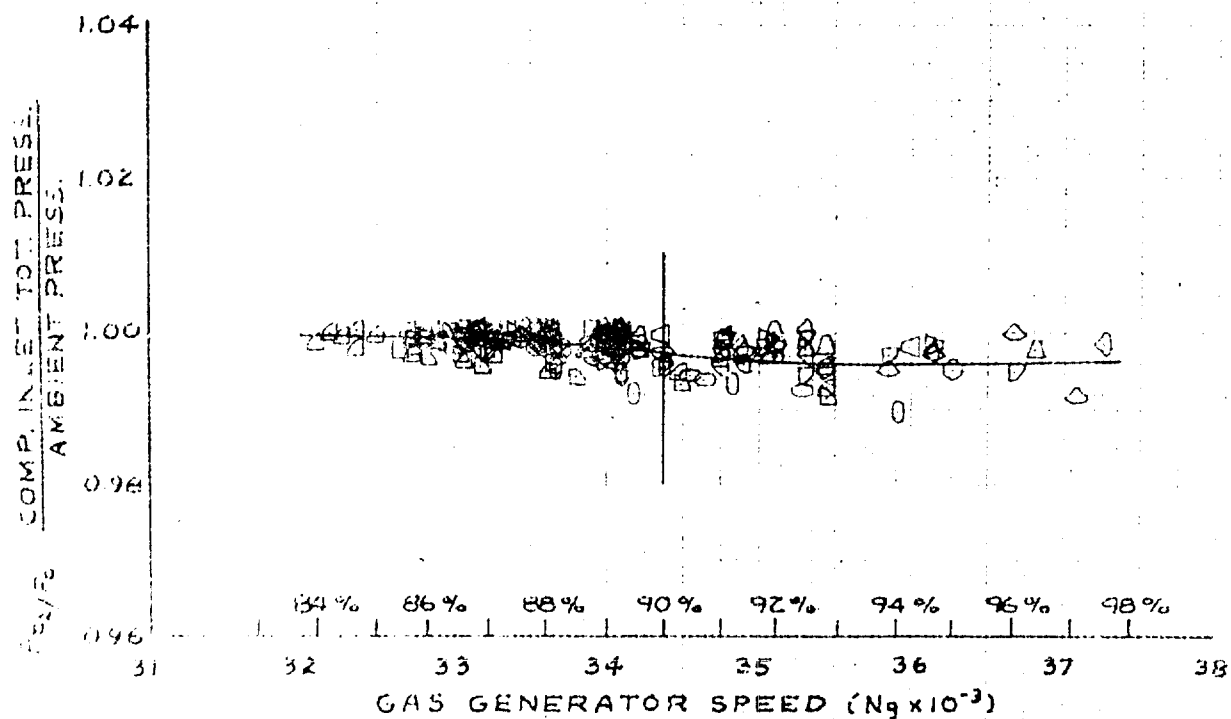


FIGURE 140 ENGINE INLET CHARACTERISTICS

UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

TWIN ENGINE OPERATION

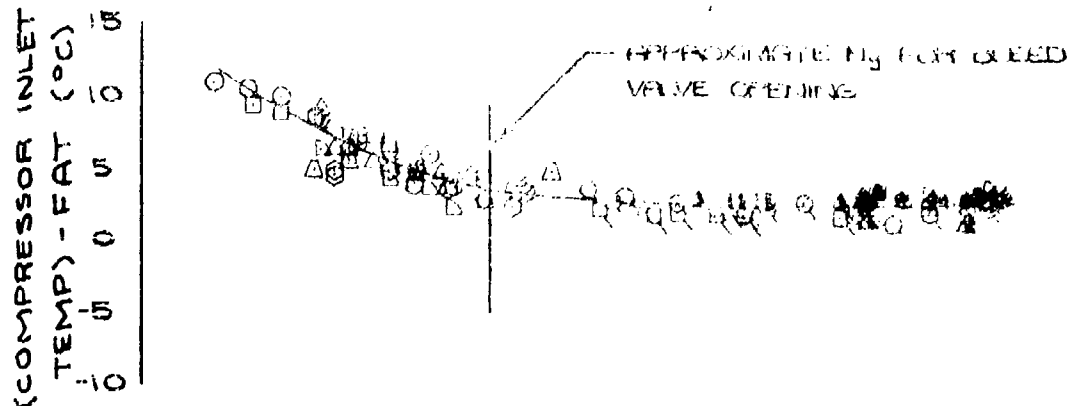
NOTE:

1. DATA OBTAINED IN HOVER
2. GEARBOX S/N 4064

| SYMBOL | SLID HEIGHT (FT) |
|--------|------------------|
| ○ | 2 |
| □ | 4 |
| △ | 10 |
| ◇ | 15 |
| ∇ | 25 |
| ○ | 35 |
| □ | 60 |
| ∇ | 100 |

LEFT ENGINE

S/N 66127



RIGHT ENGINE

S/N 66128

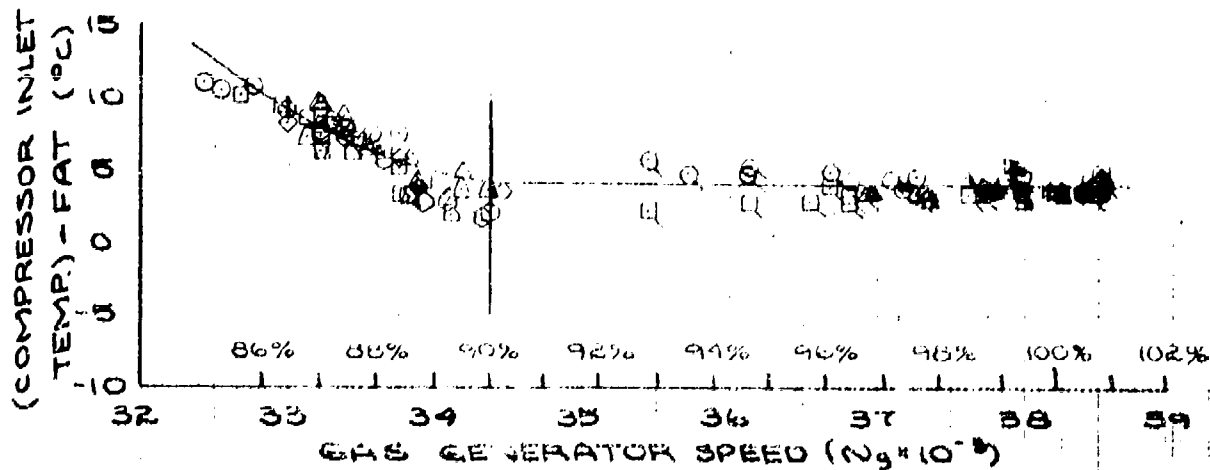


FIGURE 141 ENGINE INLET CHARACTERISTICS

UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

TWIN ENGINE OPERATION

NOTES:

1. GEARBOX S/N 4061
LEFT ENGINE S/N 66126
RIGHT ENGINE S/N 66122.
2. TRAILED SYMBOLS INDICATE
LEFT ENGINE
3. 100% N_g IS 38,180 RPM

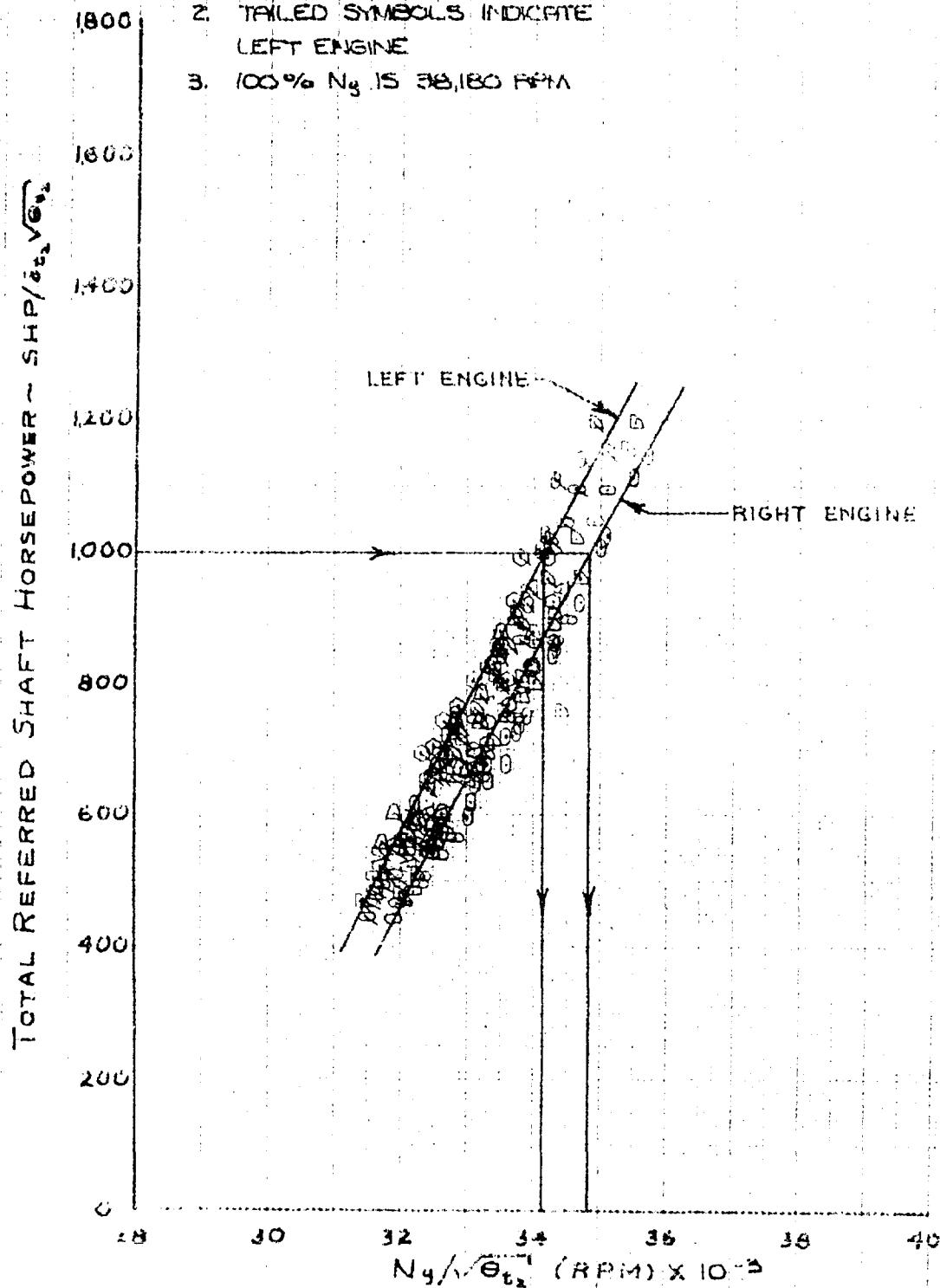


FIGURE 142. ENGINE CHARACTERISTICS

UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

TWIN ENGINE OPERATION

NOTES:

1. GEARBOX S/N 4061
2. SOLID SYMBOLS INDICATE BLEED AIR HEAT ON

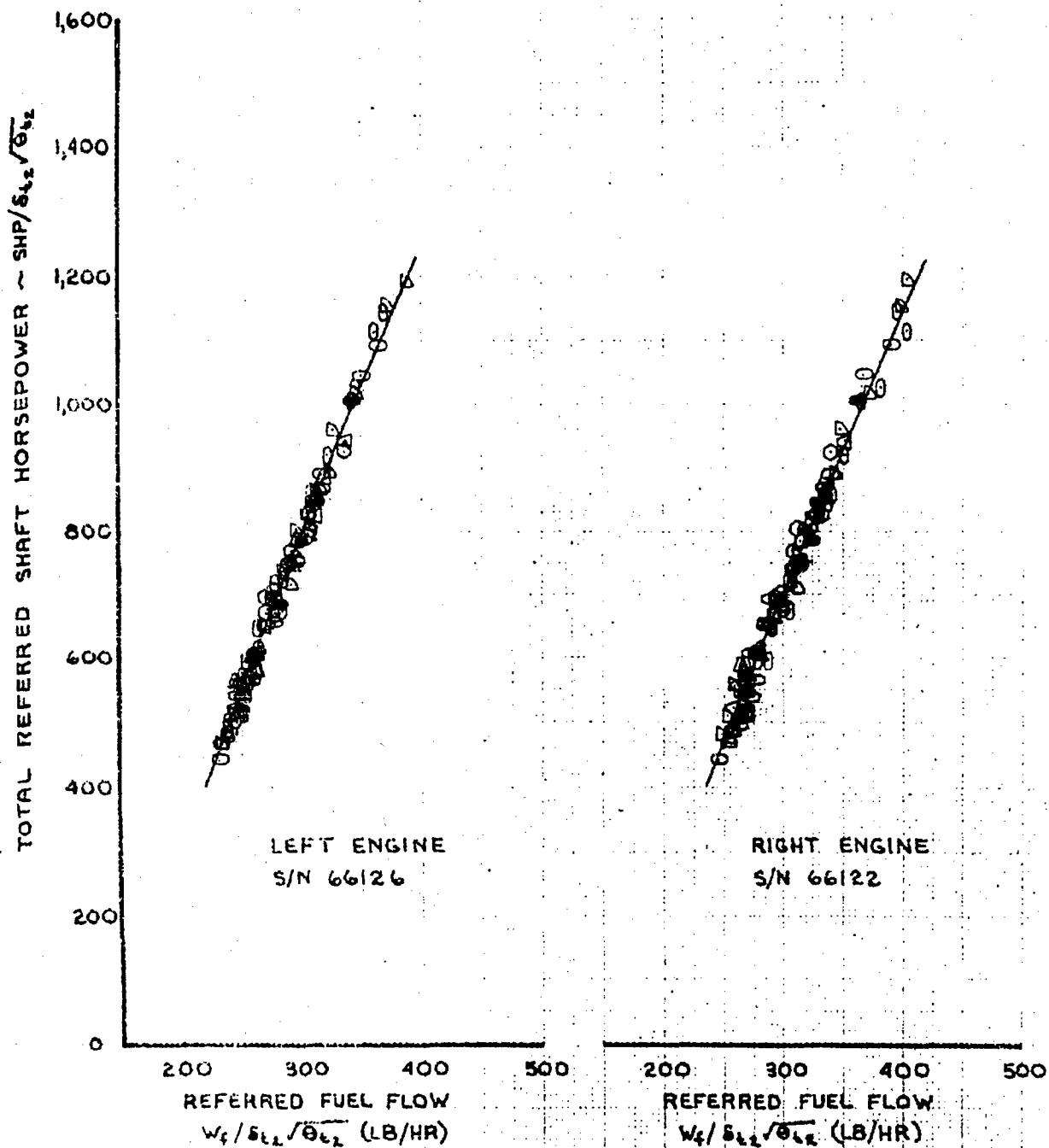


FIGURE 14B ENGINE CHARACTERISTICS

UH-1H USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

TWIN ENGINE OPERATION

NOTES:

1. GEARBOX S/N 406;
2. SOLID SYMBOLS INDICATE BLEED AIR HEAT ON
3. 100 % Ng IS 33,180 RPM

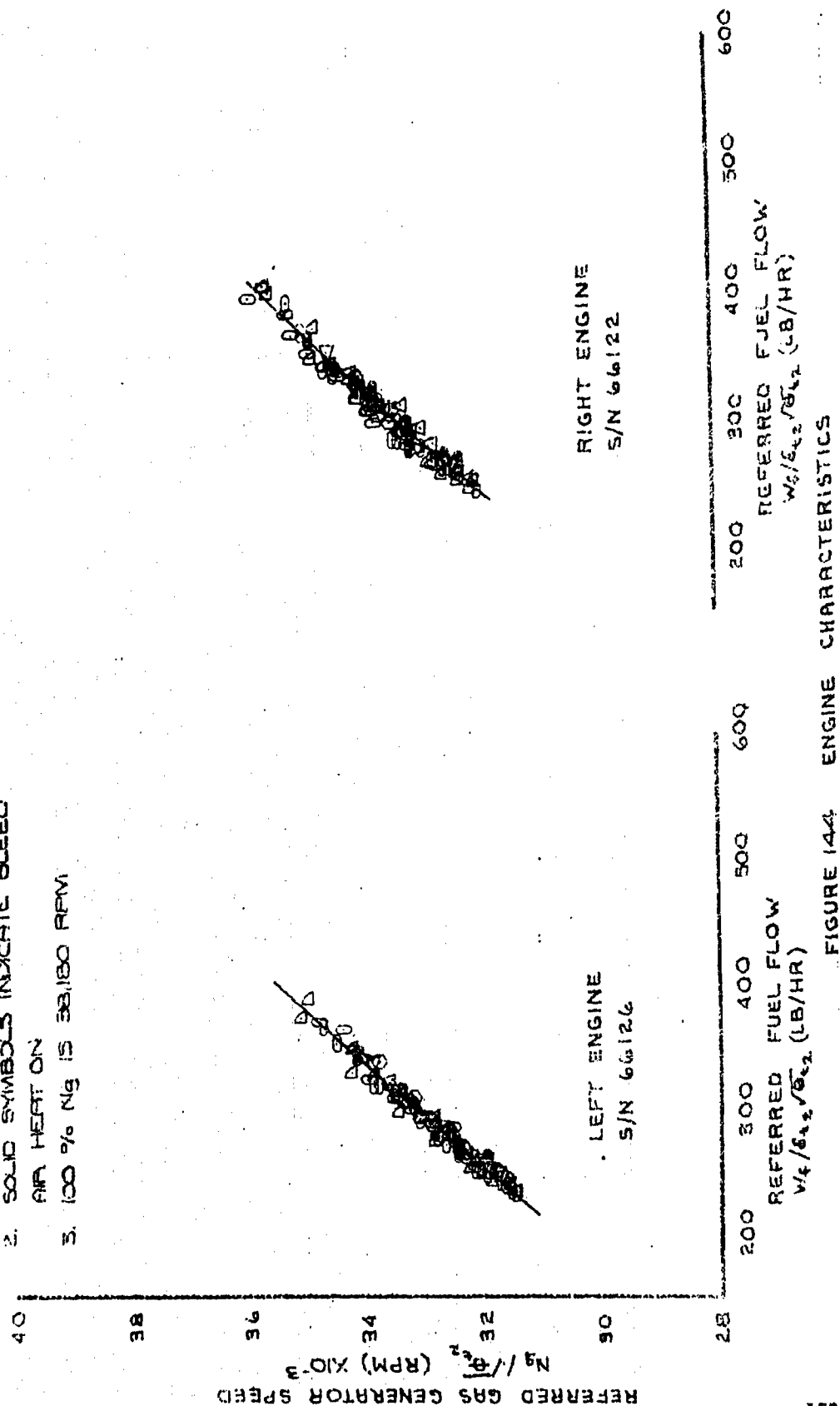


FIGURE 144 ENGINE CHARACTERISTICS

UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

TWIN ENGINE OPERATION

NOTES:

1. GEARBOX S/N 4061
2. 100% Ng IS 38,180 RPM

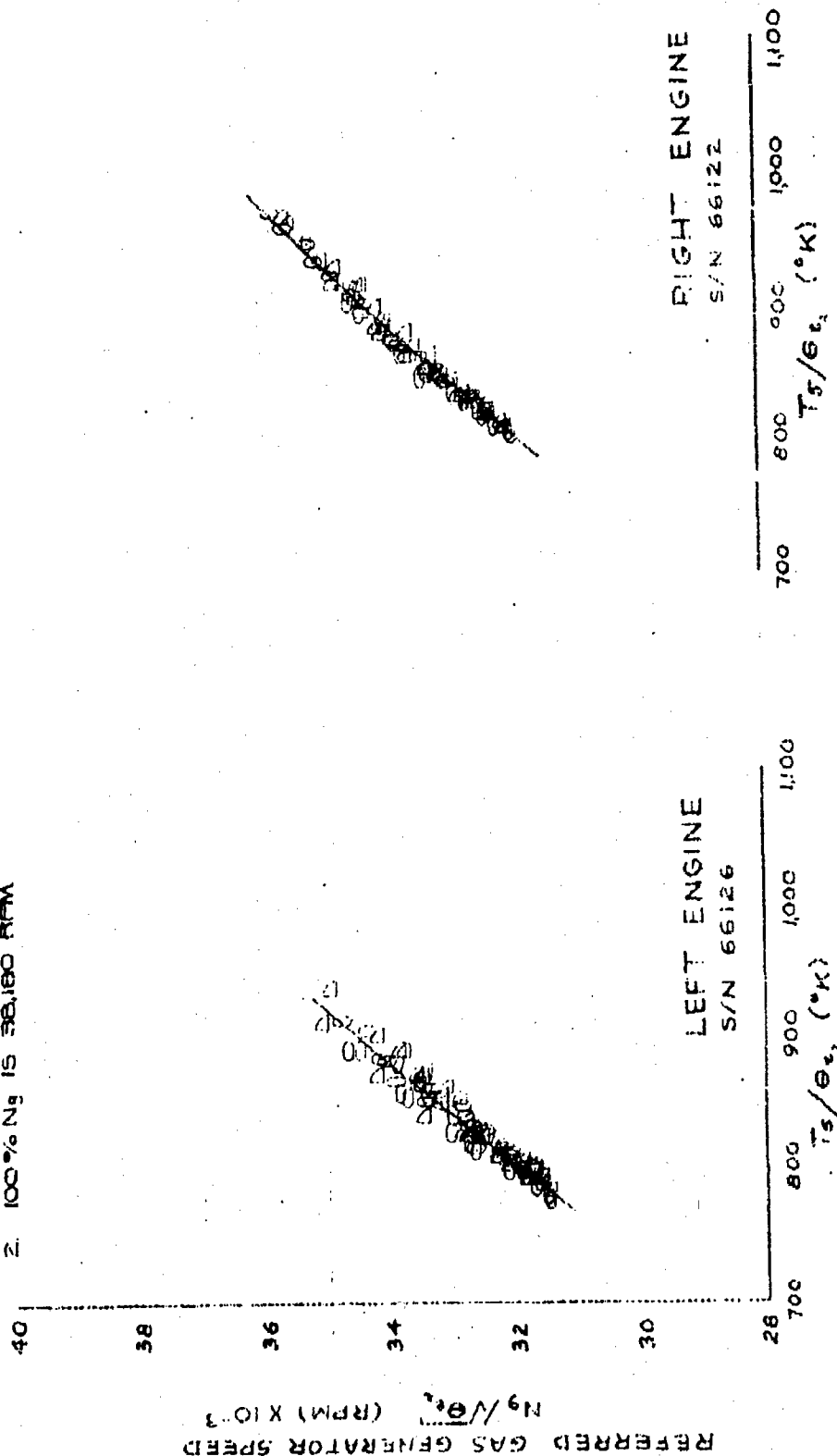


FIGURE 1A5 ENGINE CHARACTERISTICS

UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

SINGLE ENGINE OPERATION

NOTES:

1. GEARBOX S/N 4061
2. SOLID SYMBOLS INDICATE SINGLE ENGINE TOPPING POWER
3. 100% N_g IS 38,180 RPM

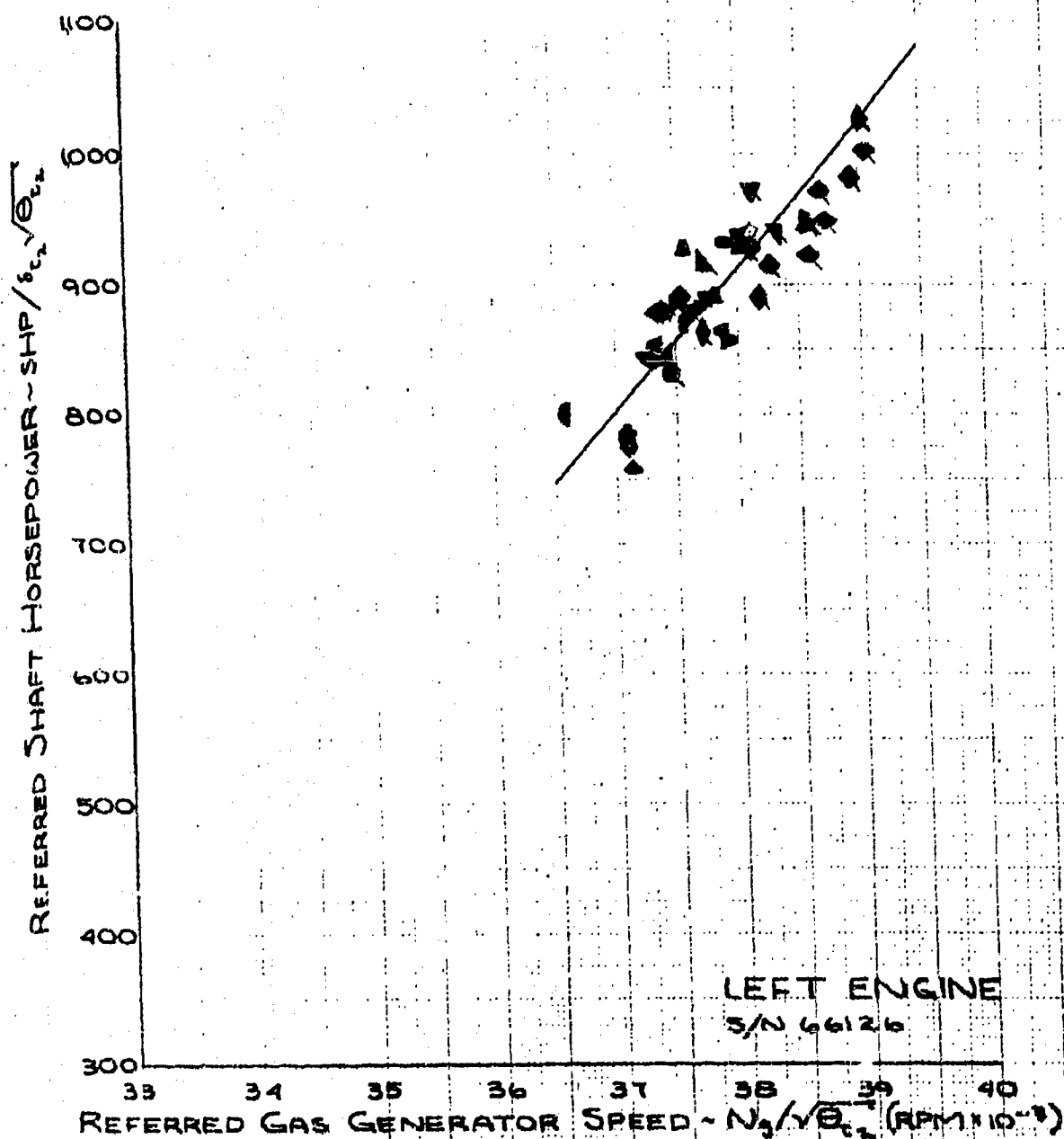


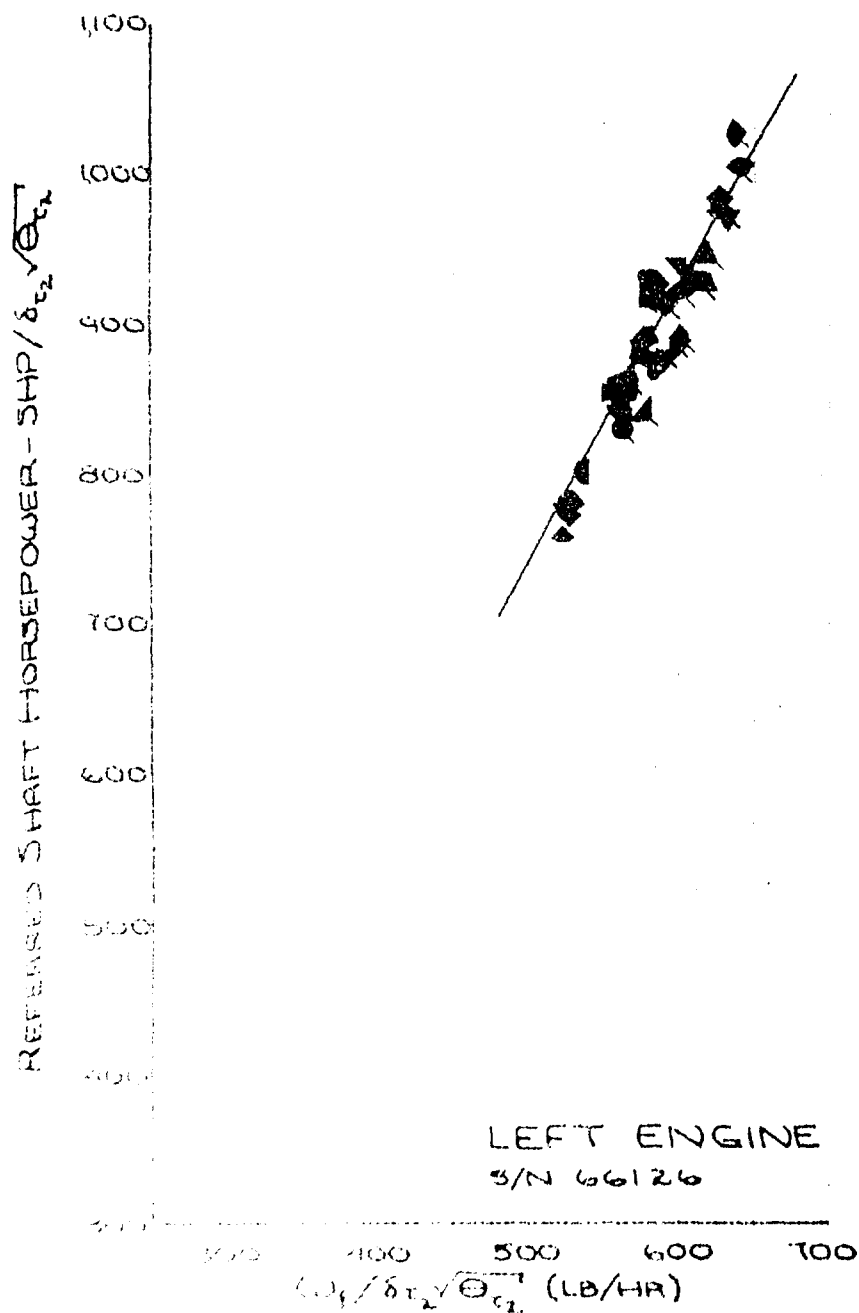
FIGURE 146: ENGINE CHARACTERISTICS

UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

SINGLE ENGINE OPERATION

NOTES:

1. GEARBOX S/N 4061
2. SOLID SYMBOLS INDICATE SINGLE ENGINE TOPPING POWER



Best Available Copy

UH-1H USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

SINGLE ENGINE OPERATION

NOTES:

1. GEARBOX S/N 4061
2. SOLID SYMBOLS INDICATE SINGLE ENGINE TOPPING POWER
3. 100 % N_g IS 38,180 RPM

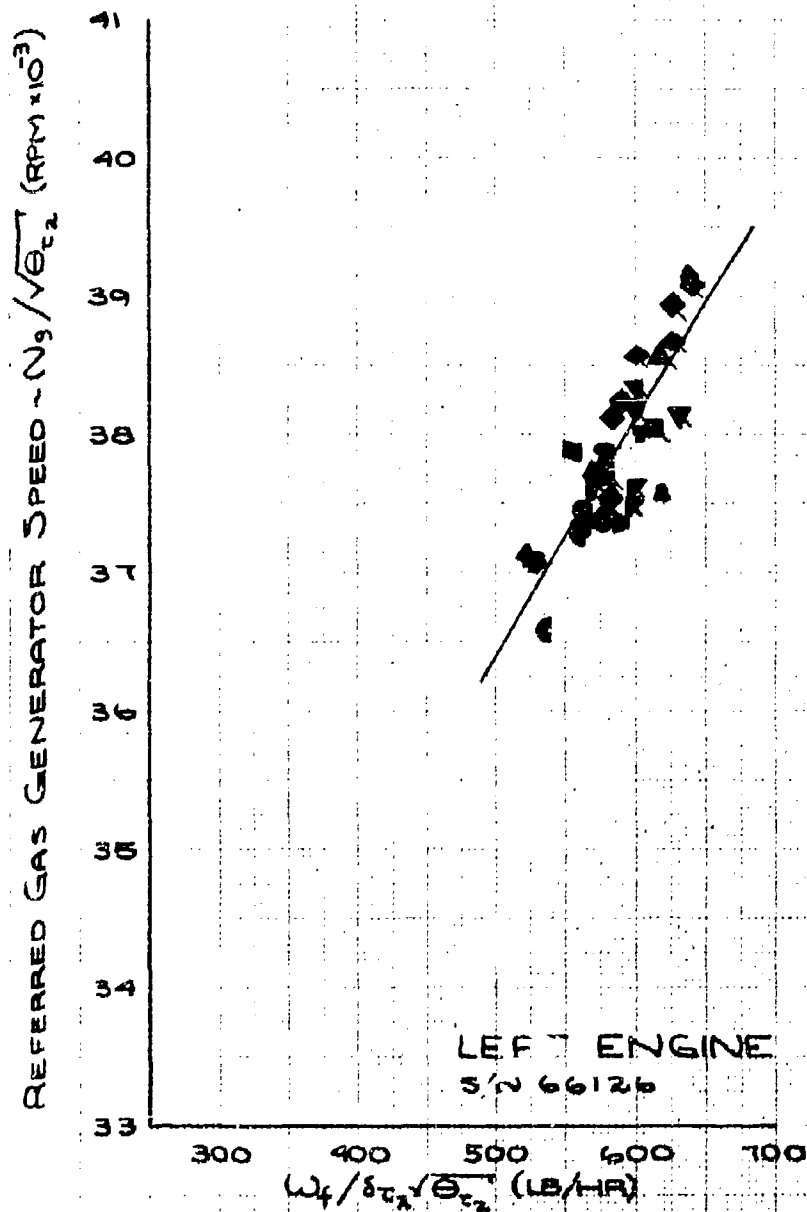


FIGURE 148 ENGINE CHARACTERISTICS

UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

SINGLE ENGINE OPERATION

NOTES :

1. GEARBOX S/N 4061
2. SOLID SYMBOLS INDICATE SINGLE
ENGINE TOPPING POWER
3. 100% N_g IS 38,180 RPM

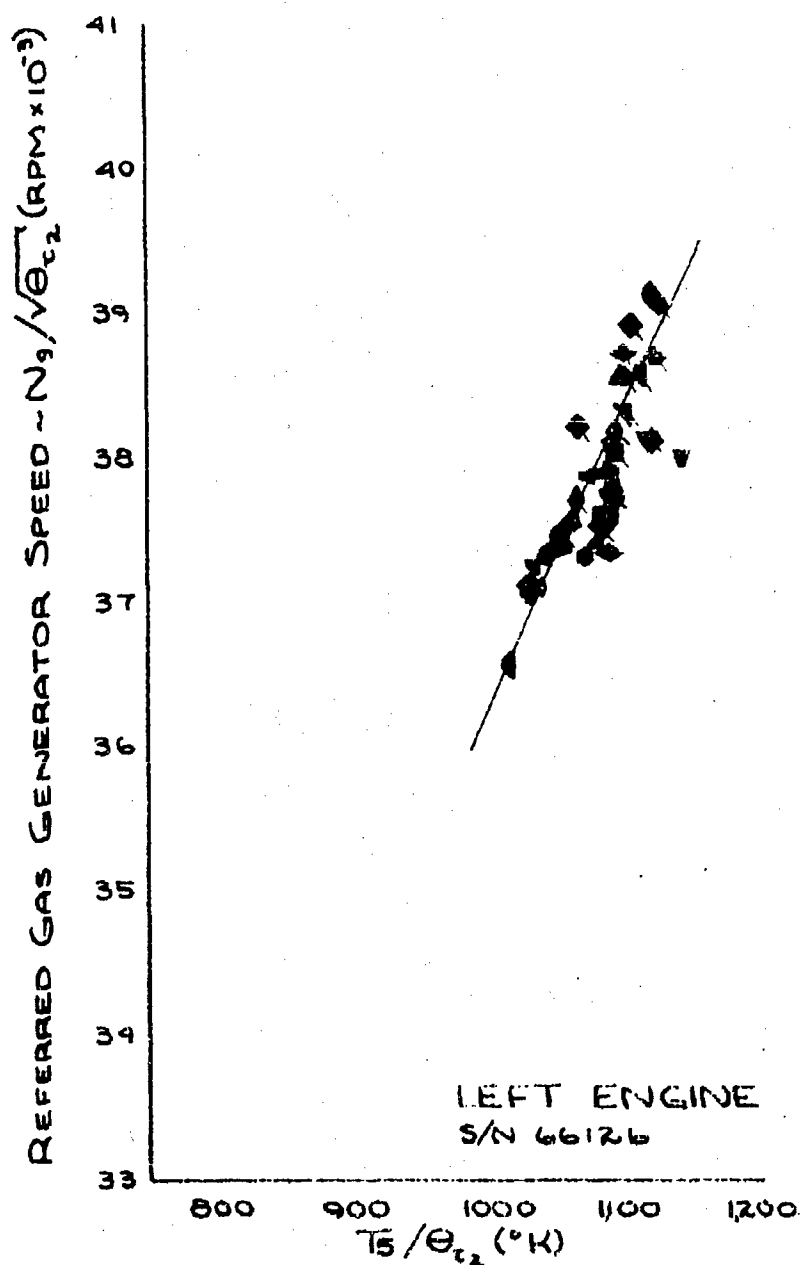


FIGURE 149. ENGINE CHARACTERISTICS

UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

SINGLE ENGINE OPERATION

NOTES:

1. GEARBOX S/N 4061
2. SOLID SYMBOLS INDICATE SINGLE ENGINE TOPPING POWER
3. DASHED LINE INDICATES UACI CALIBRATION 26 DEC 70
4. 100% Ng IS 58,180 RPM

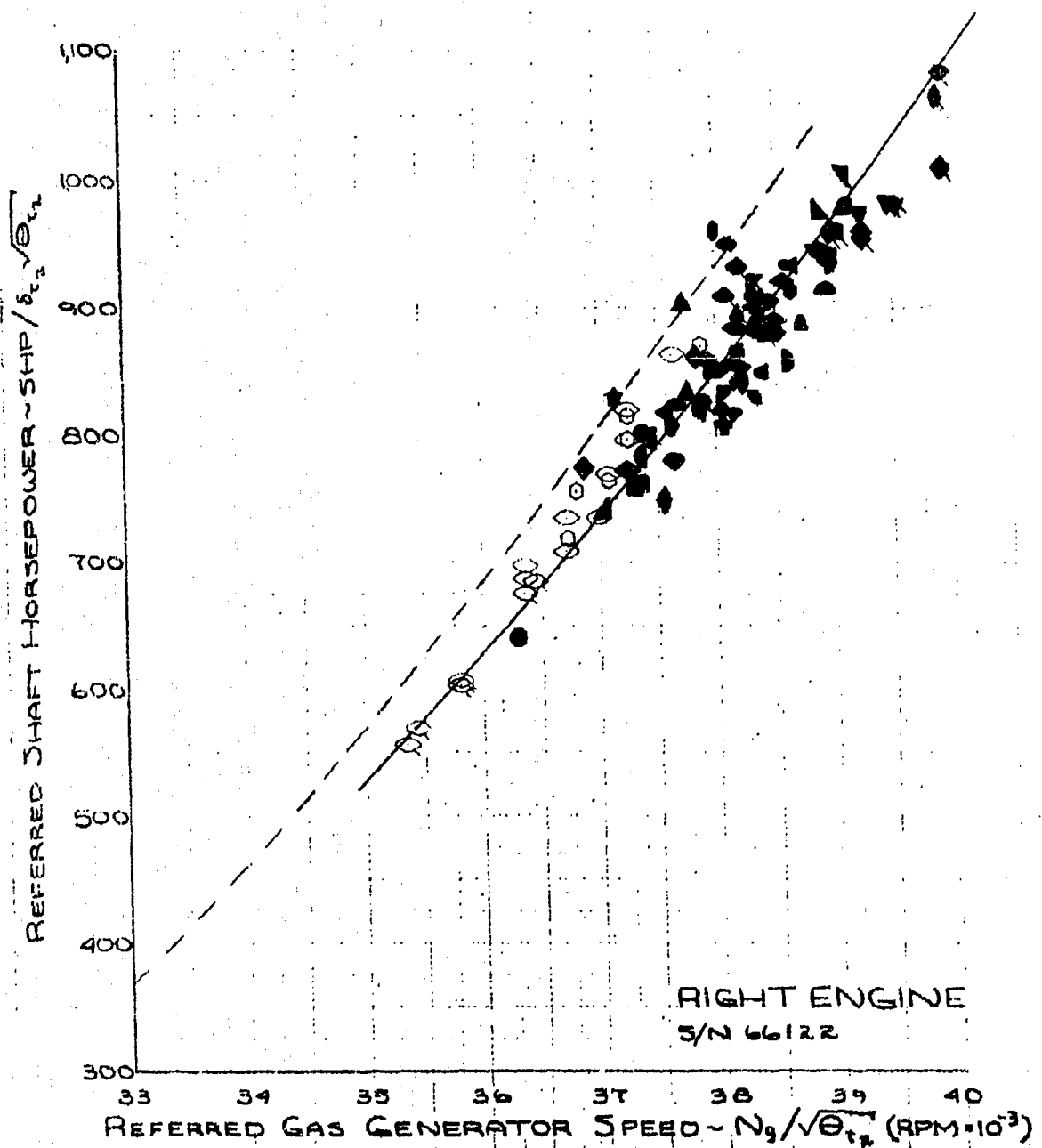


FIGURE 150 ENGINE CHARACTERISTICS

UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

SINGLE ENGINE OPERATION

NOTES :

1. GEARBOX S/N 4061
2. SOLID SYMBOLS INDICATE SINGLE ENGINE TOPPING POWER
3. DASHED LINE INDICATES UACL CALIBRATION 26 DEC 70

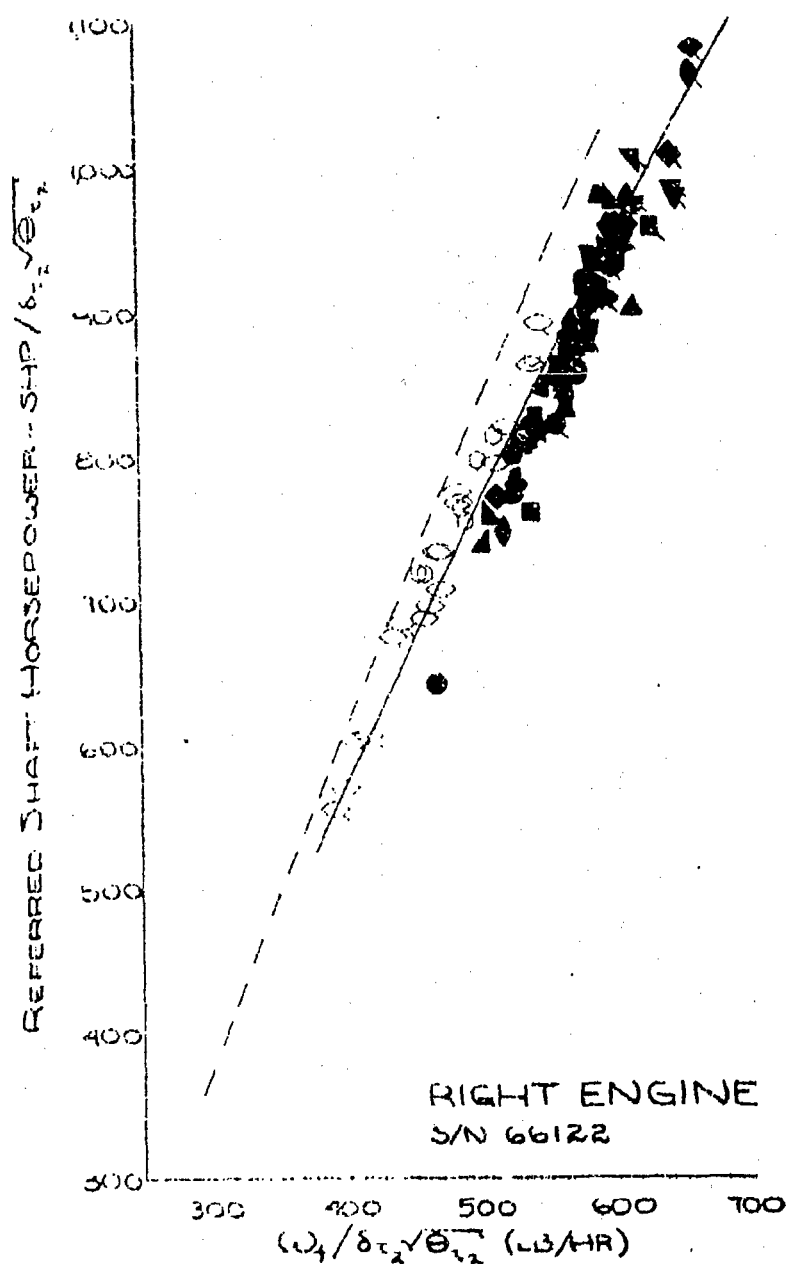


FIGURE 151 - ENGINE CHARACTERISTICS

UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

SINGLE ENGINE OPERATION

NOTES:

1. GEARBOX S/N 4061
2. SOLID SYMBOLS INDICATE SINGLE ENGINE TOPPING POWER
3. DASHED LINE INDICATES UACL CALIBRATION 26 DEC 70
4. 100% N_g IS 38,180 RPM

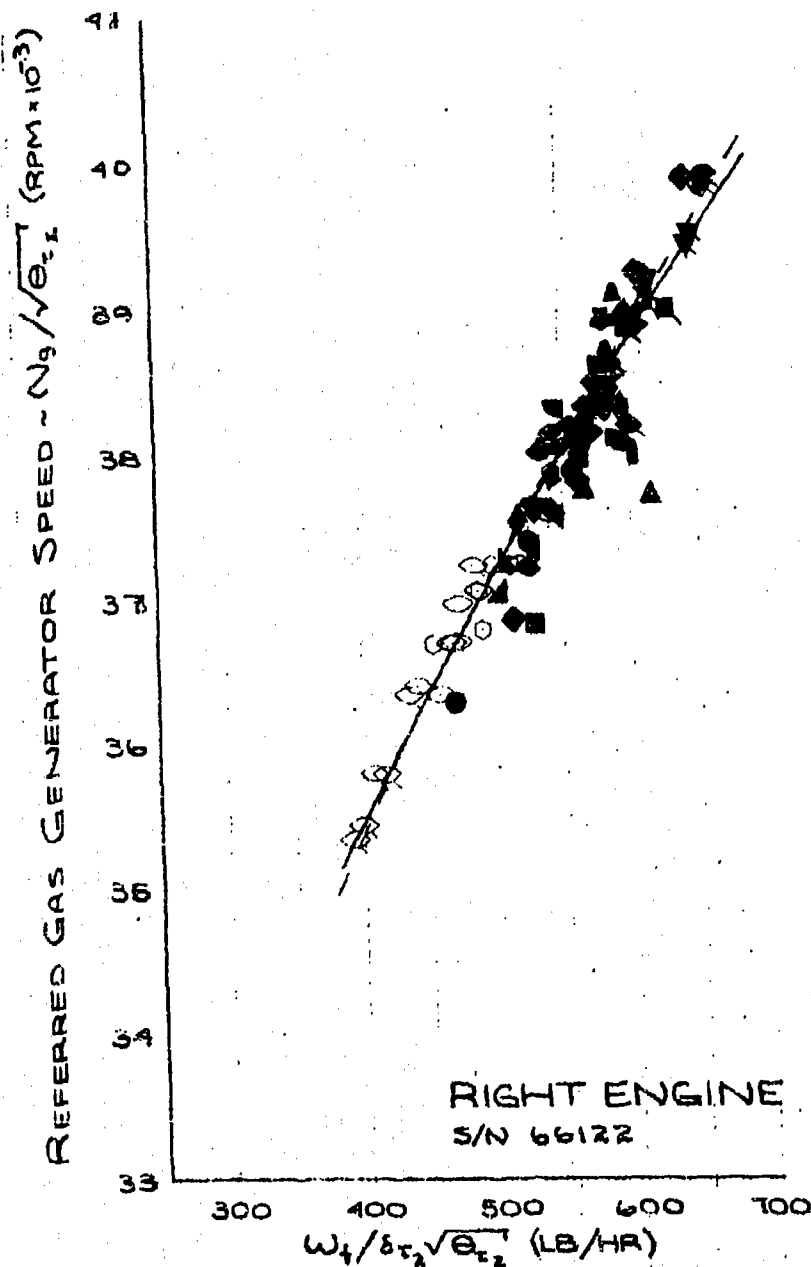


FIGURE 152. ENGINE CHARACTERISTICS

UH-1H USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

SINGLE ENGINE OPERATION

NOTES :

1. GEARBOX S/N 4061
2. SOLID SYMBOLS INDICATE SINGLE ENGINE TOPPING POWER
3. DASHED LINE INDICATES URCL CALIBRATION 26 DEC 70
4. 100 % N_g IS 36180 RPM

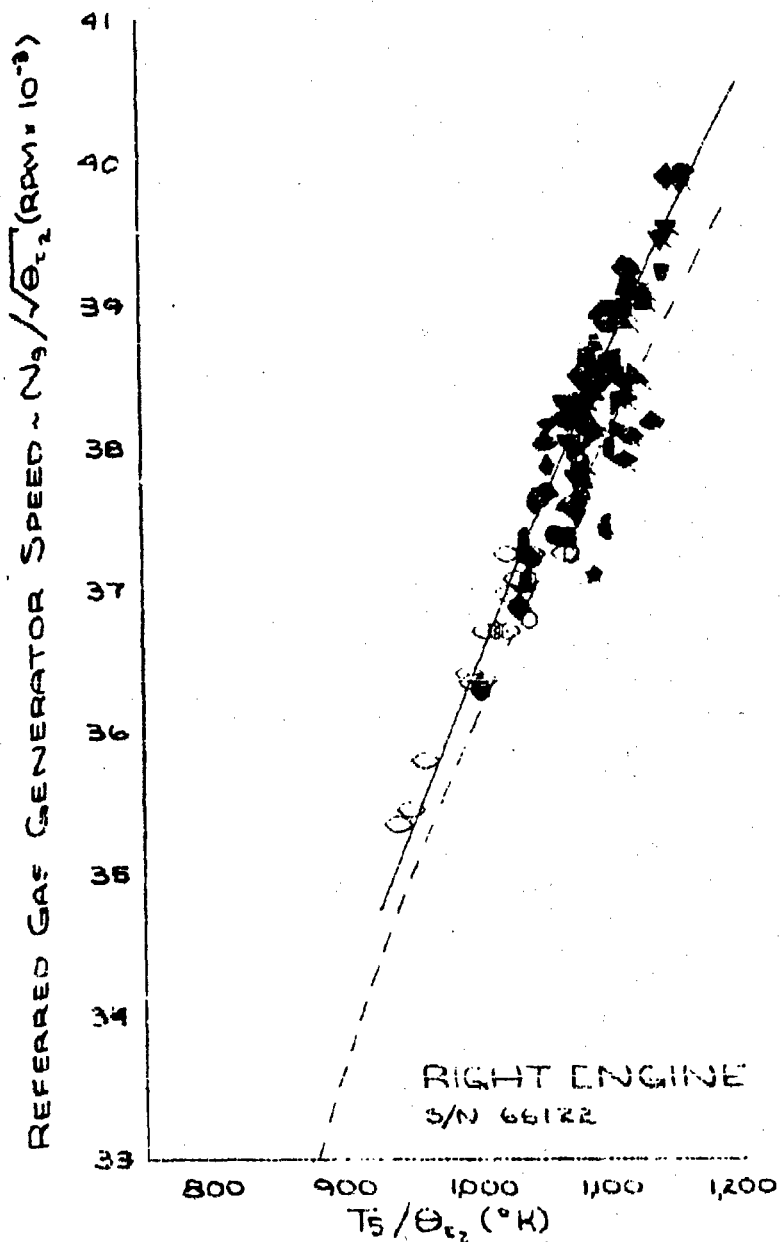


FIGURE 153 ENGINE CHARACTERISTICS

UH-1N USAF S/N 68-10776

T400-CP-400 ENGINE

CATEGORY II

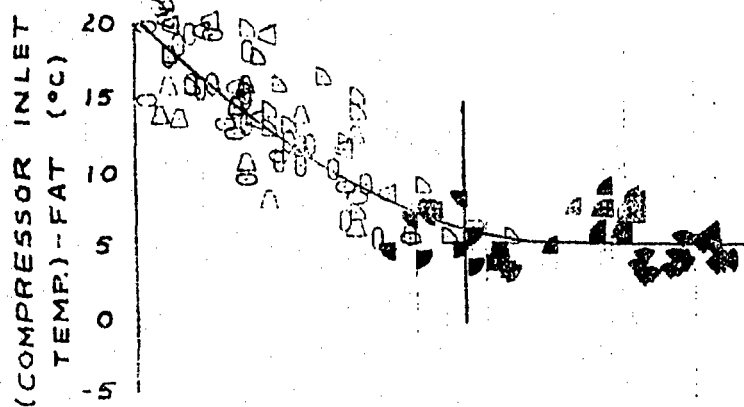
TWIN ENGINE OPERATION

NOTES:

1. GEARBOX S/N 4061
2. DATA OBTAINED IN LEVEL FLIGHT AND CLIMB
3. SOLID SYMBOLS INDICATE DATA OBTAINED IN A CLIMB
4. 100% N_9 IS 33,180 RPM

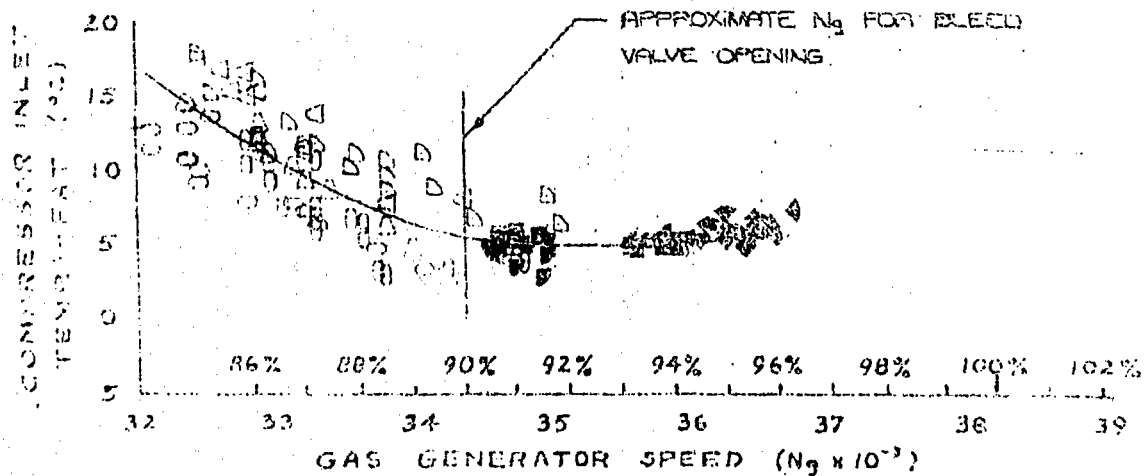
LEFT ENGINE

S/N 66126



RIGHT ENGINE

S/N 66122



UH-1N USAF S/N 68-10776

T400-CP-400 ENGINE

CATEGORY II

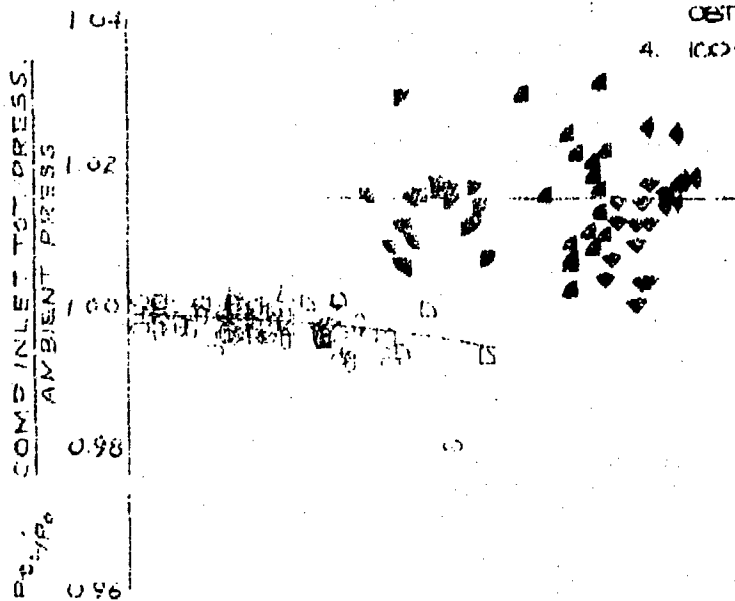
TWIN ENGINE OPERATION

NOTES:

1. GEARBOX S/N 4061
2. DATA OBTAINED IN LEVEL FLIGHT AND CLIMB
3. SOLID SYMBOLS INDICATE DATA OBTAINED IN A CLIMB
4. 100% N_3 IS 38180 RPM

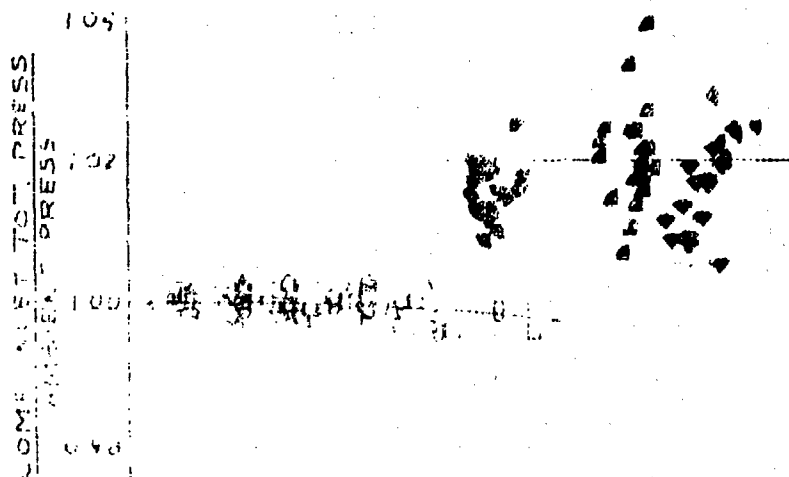
LEFT ENGINE

S/N 66126



RIGHT ENGINE

S/N 66126



66% 68% 90% 92% 94% 96% 98% 100% 102%

32 33 34 35 36 37 38 39

$N_3 \times 10^{-3}$ GENERATOR SPEED ($N_3 \times 10^{-3}$)

UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

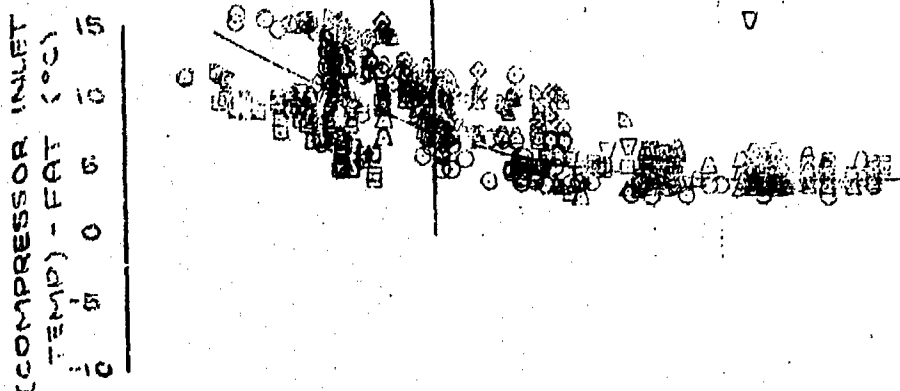
TWIN ENGINE OPERATION

NOTE:

1. DATA OBTAINED IN HOVER
2. GEARBOX S/N 4061

| SYMBOL | SKID HEIGHT (FT) |
|--------|------------------|
| ○ | 2 |
| □ | 4 |
| △ | 10 |
| ◇ | 15 |
| △ | 25 |
| ○ | 35 |
| △ | 60 |
| ▽ | 100 |

LEFT ENGINE
S/N 66126



RIGHT ENGINE
S/N 66122

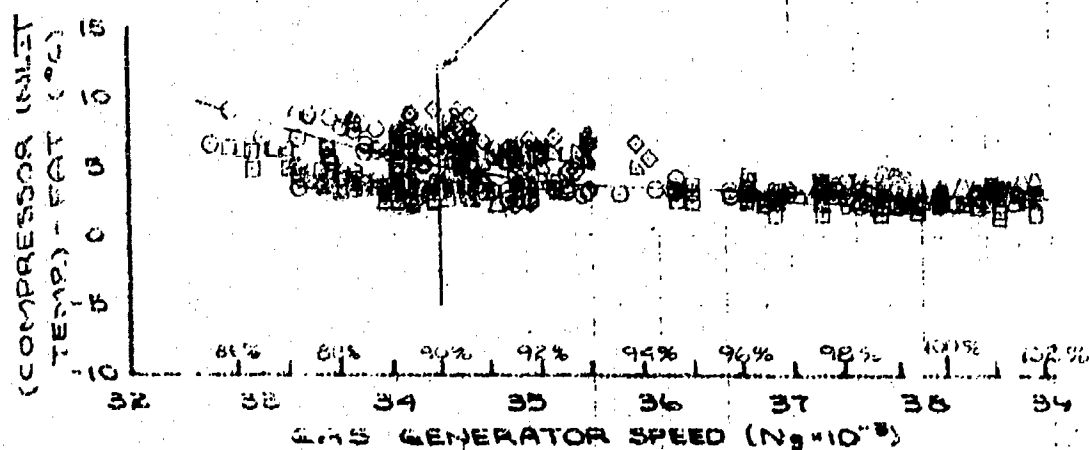


FIGURE 150 ENGINE INLET CHARACTERISTICS

UH-1N USAF S/N 68-10776

T400-CP-400 ENGINE

CATEGORY II

TWIN ENGINE OPERATION

NOTE:

1. DATA OBTAINED IN HOVER.

2. GEARBOX S/N 4061

LEFT ENGINE

S/N 66126

| SYMBOL | SKID HEIGHT (FT) |
|--------|------------------|
| ○ | 2 |
| □ | 4 |
| △ | 10 |
| ◇ | 15 |
| △ | 25 |
| ○ | 35 |
| ◇ | 60 |
| ▽ | 100 |

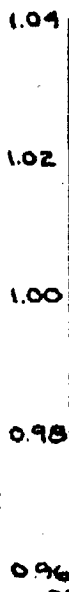
COMP. INLET TOT. PRESS.
AMBIENT PRESS.
 P_{t2}/P_a



RIGHT ENGINE

S/N 66122

COMP. INLET TOT. PRESS.
AMBIENT PRESS.
 P_{t2}/P_a



86% 88% 90% 92% 94% 96% 98% 100% 102%
32 33 34 35 36 37 38 39
GAS GENERATOR SPEED ($N_g \times 10^{-3}$)

UH-1N USAF S/N 68-10776

T400-CP-400 ENGINE

CATEGORY II

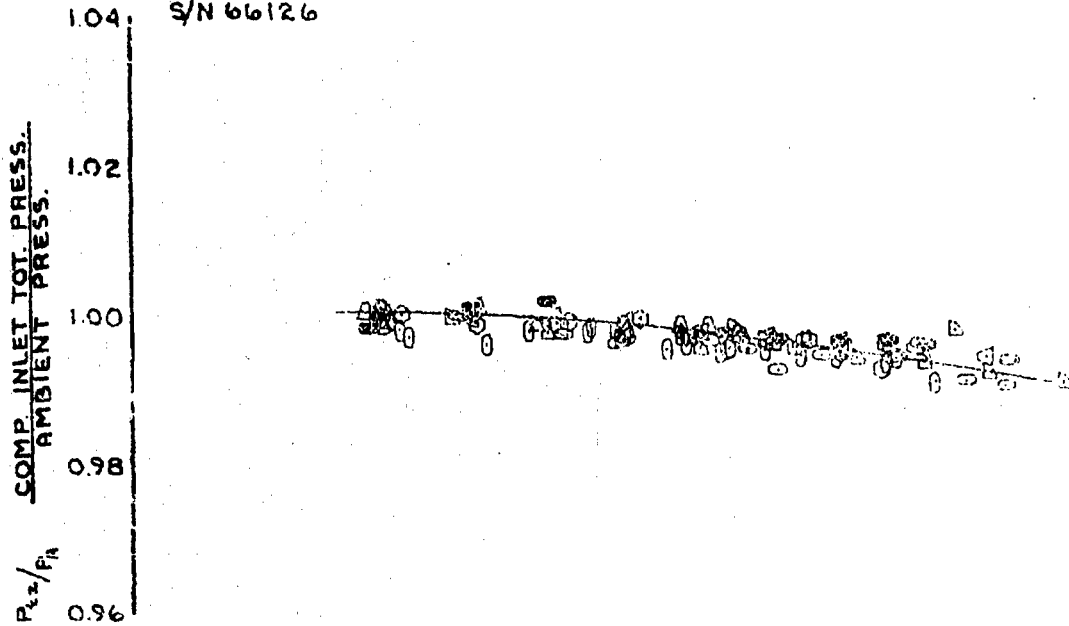
TWIN ENGINE OPERATION

NOTES:

1. GEARBOX S/N 4011
2. DATA OBTAINED IN LEVEL FLIGHT

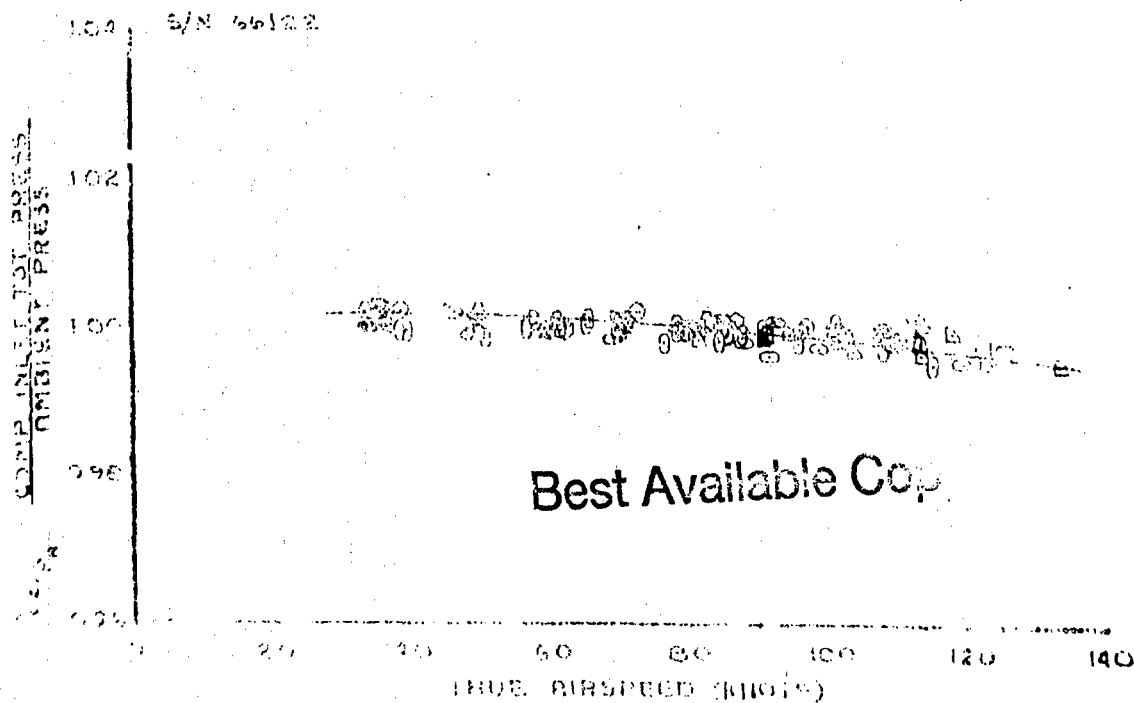
LEFT ENGINE

S/N 66126



RIGHT ENGINE

S/N 66122



Best Available Copy

UH-1H USAF S/N 68-10776

T400-CP-400 ENGINE

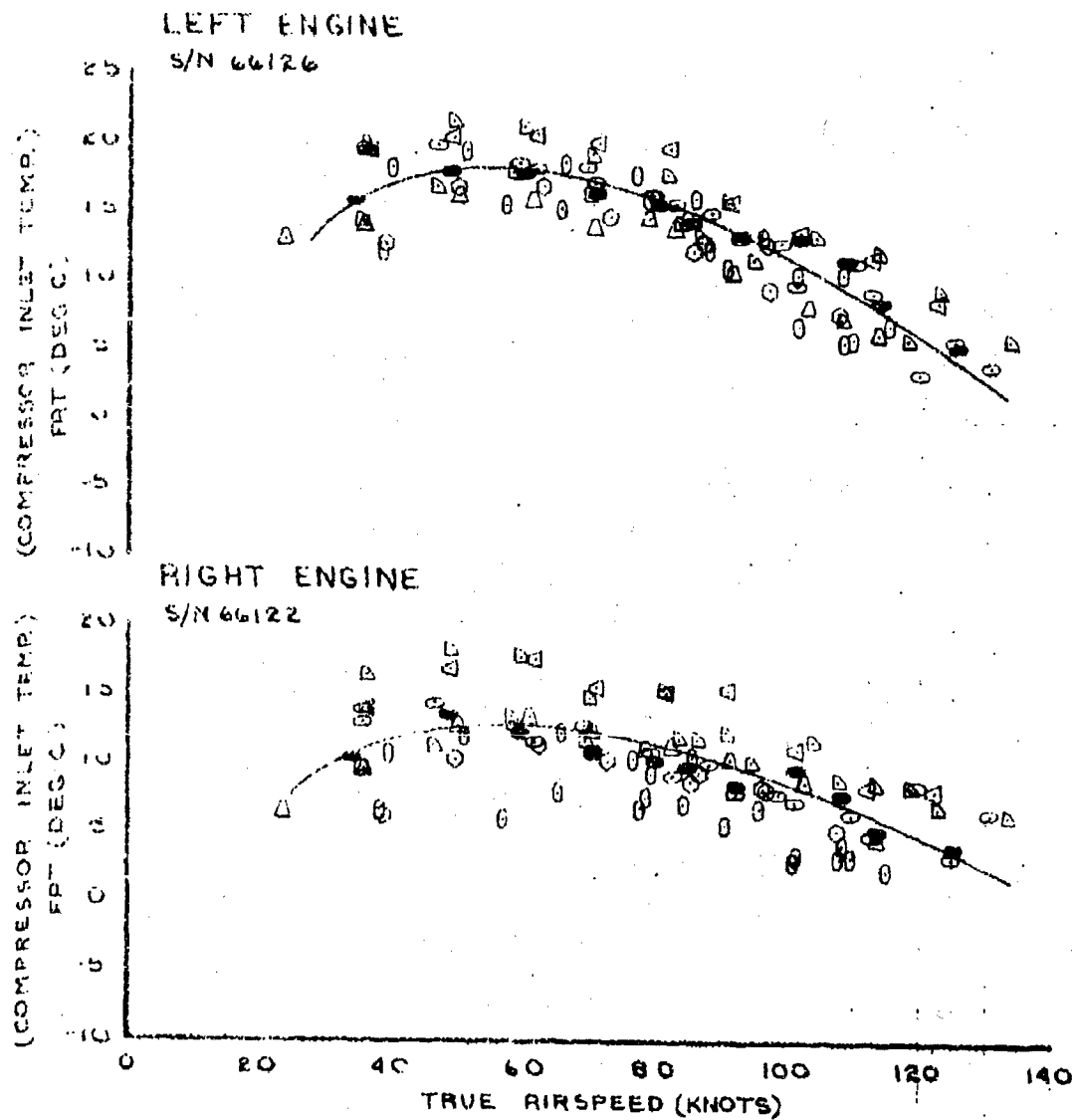
CATEGORY II

TWIN ENGINE OPERATION

NOTES:

1. GEARBOX S/N 4061

2. DATA OBTAINED IN LEVEL FLIGHT



UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

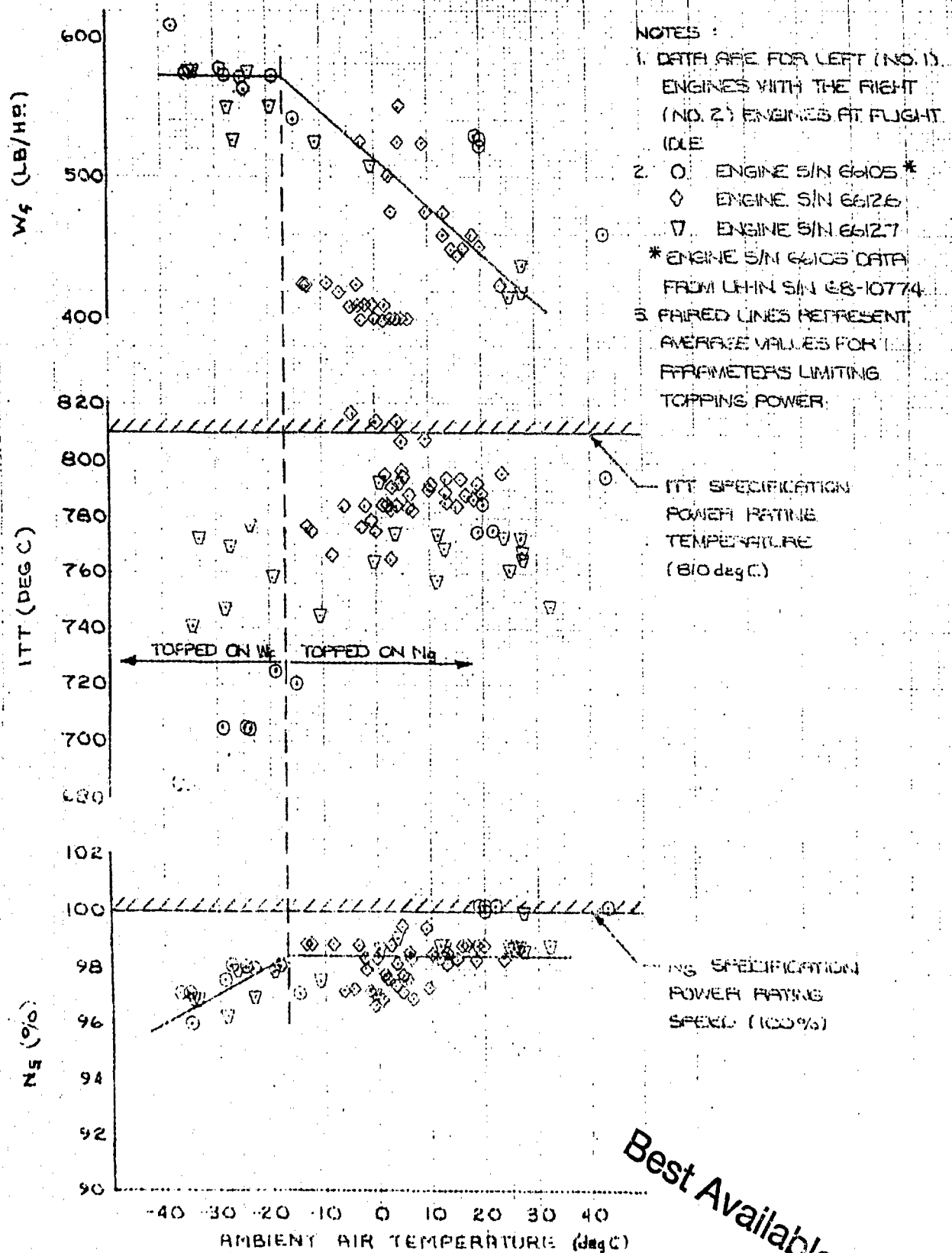
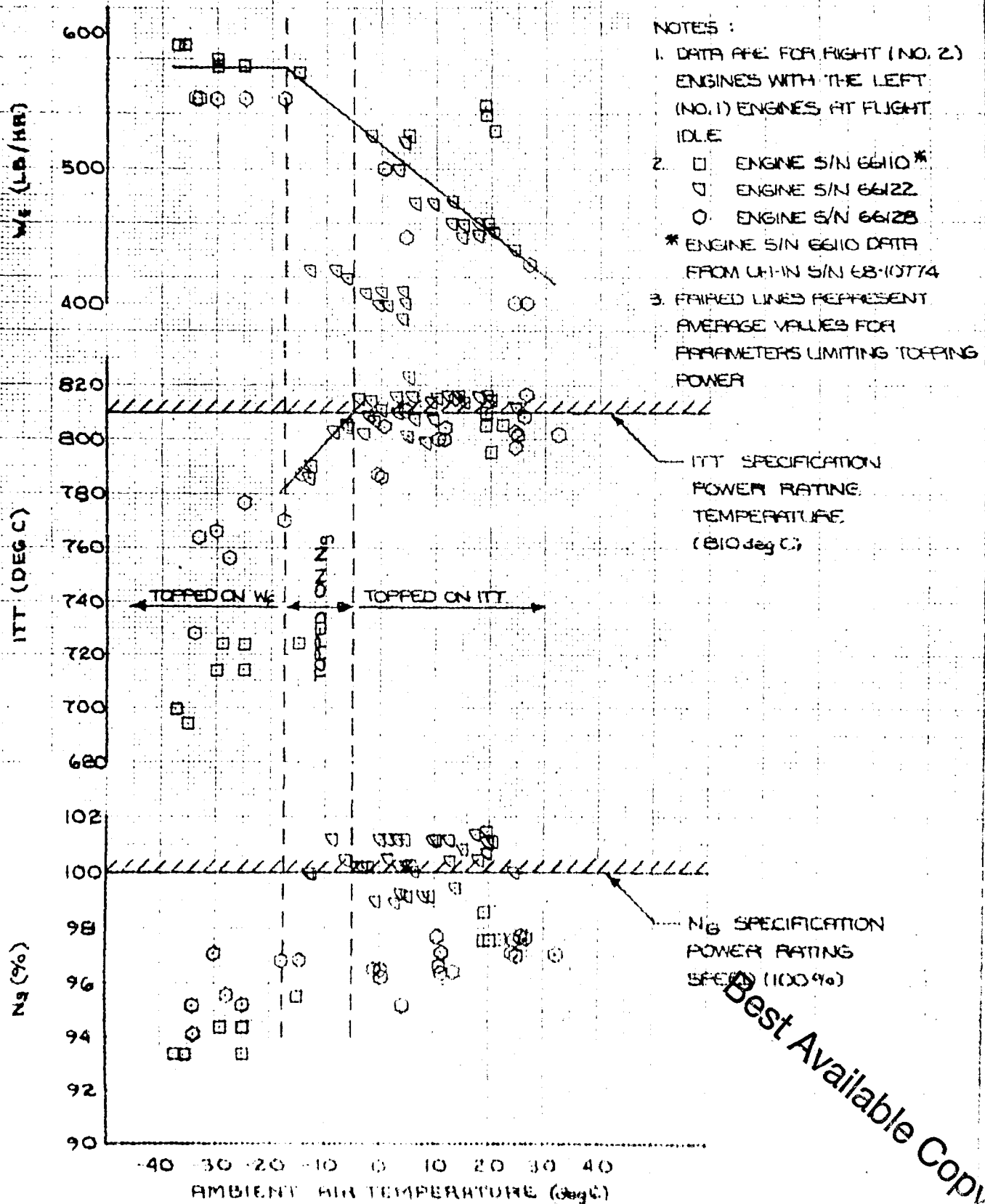


FIGURE 100 ENGINE TOPPING VARIANCE WITH T_a

UH-1N UGAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

NOTES :

1. DATA ARE FOR RIGHT (NO. 2) ENGINES WITH THE LEFT (NO. 1) ENGINES AT FLIGHT IDLE
2. \square ENGINE S/N 66110 *
 ∇ ENGINE S/N 66122
 \circ ENGINE S/N 66128
* ENGINE S/N 66110 DATA FROM UH-1N S/N 68-10774
3. FAIRED LINES REPRESENT AVERAGE VALUES FOR PARAMETERS LIMITING TOPPING POWER



UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

NOTES:

1. SHAFT HORSEPOWER
BASED ON:
- A. CIT RISE = 3.5 deg C
- B. $P_2/P_3 = 0.995$
- C. FIGURES 13-138
AND 160-161

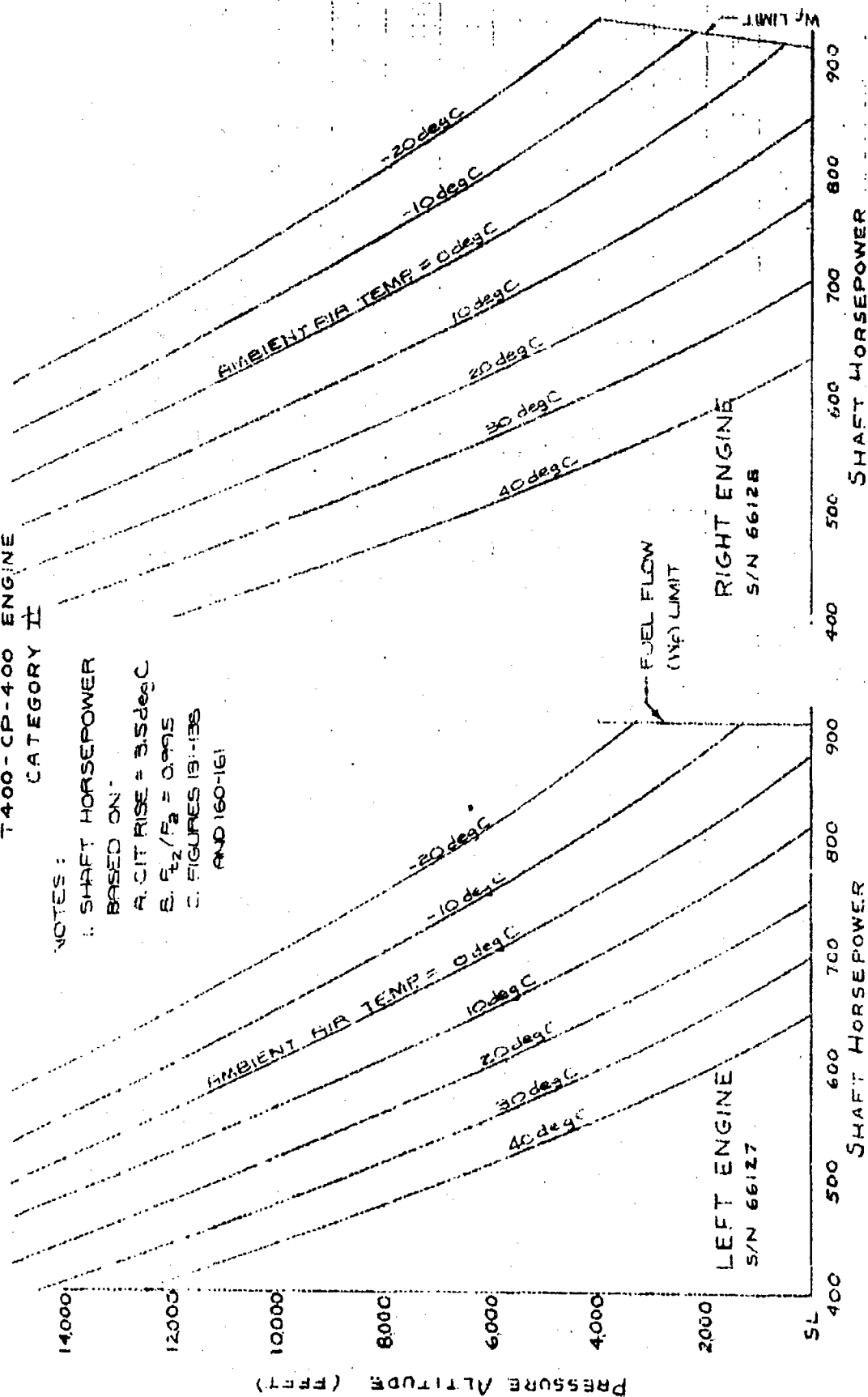


FIGURE 162 SINGLE ENGINE SHAFT HORSEPOWER AVAILABLE

UH-1N USAF S/N 68-10776
 T400-CP-400 ENGINE

CATEGORY II

NOTES:

1. SHAFT HORSEPOWER
 SPEED ON:
- A. CRUISE = 3.5 deg/c
- B. $P_{22}/P_3 = 0.995$
- C. FIGURES 145 - 153
 AND 160-161

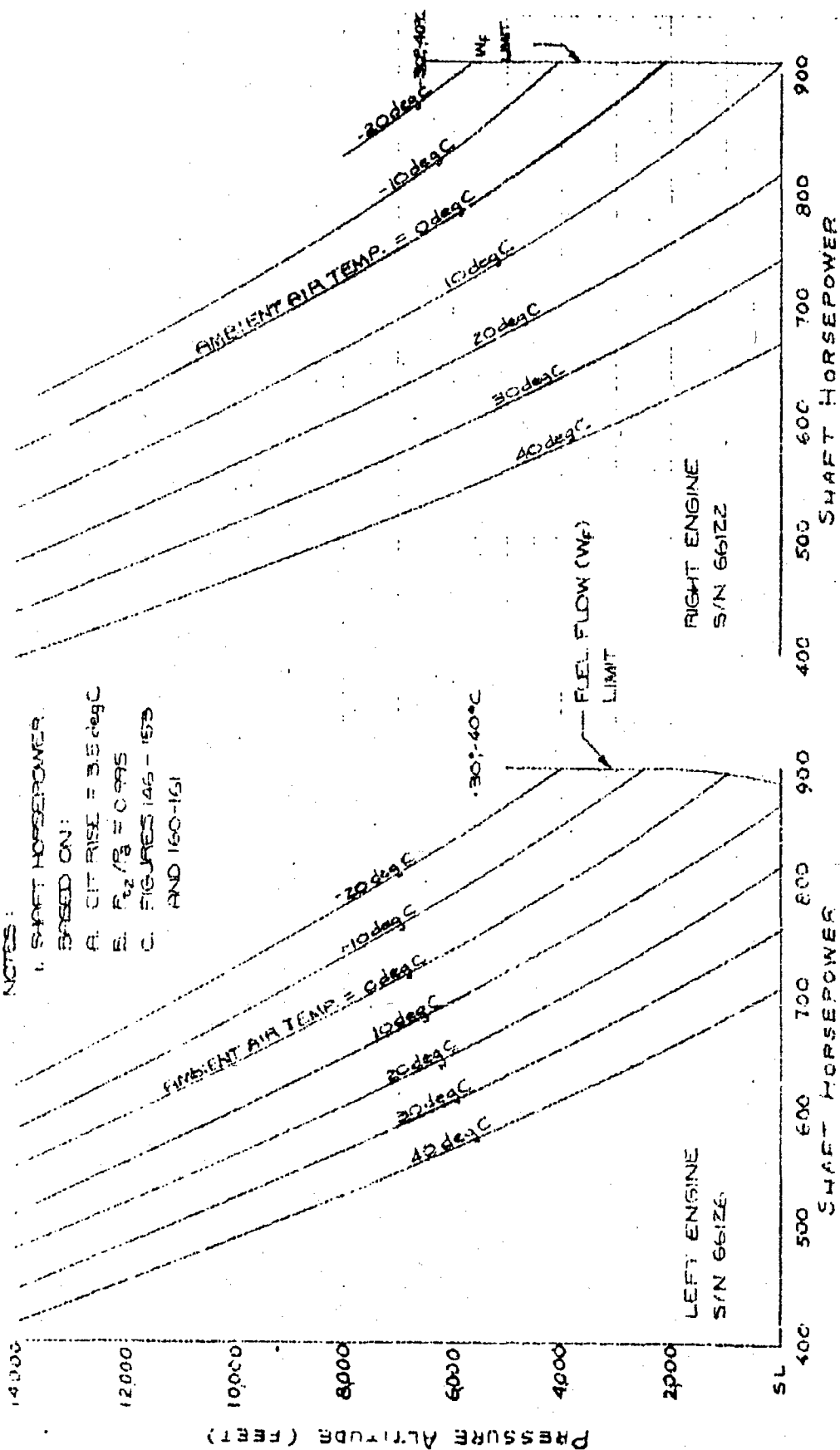


FIGURE 163 SINGLE ENGINE SHAFT HORSEPOWER AVAILABLE

OIL IN USE: 5146-10776
 T400-CP-400 ENGINE
 CATEGORY II

NOTE:

1. DATA FOR LEFT ENGINE (NO. 1)
2. S/N COMPARED WITH RIGHT ENGINE
3. AT FLIGHT IDLE

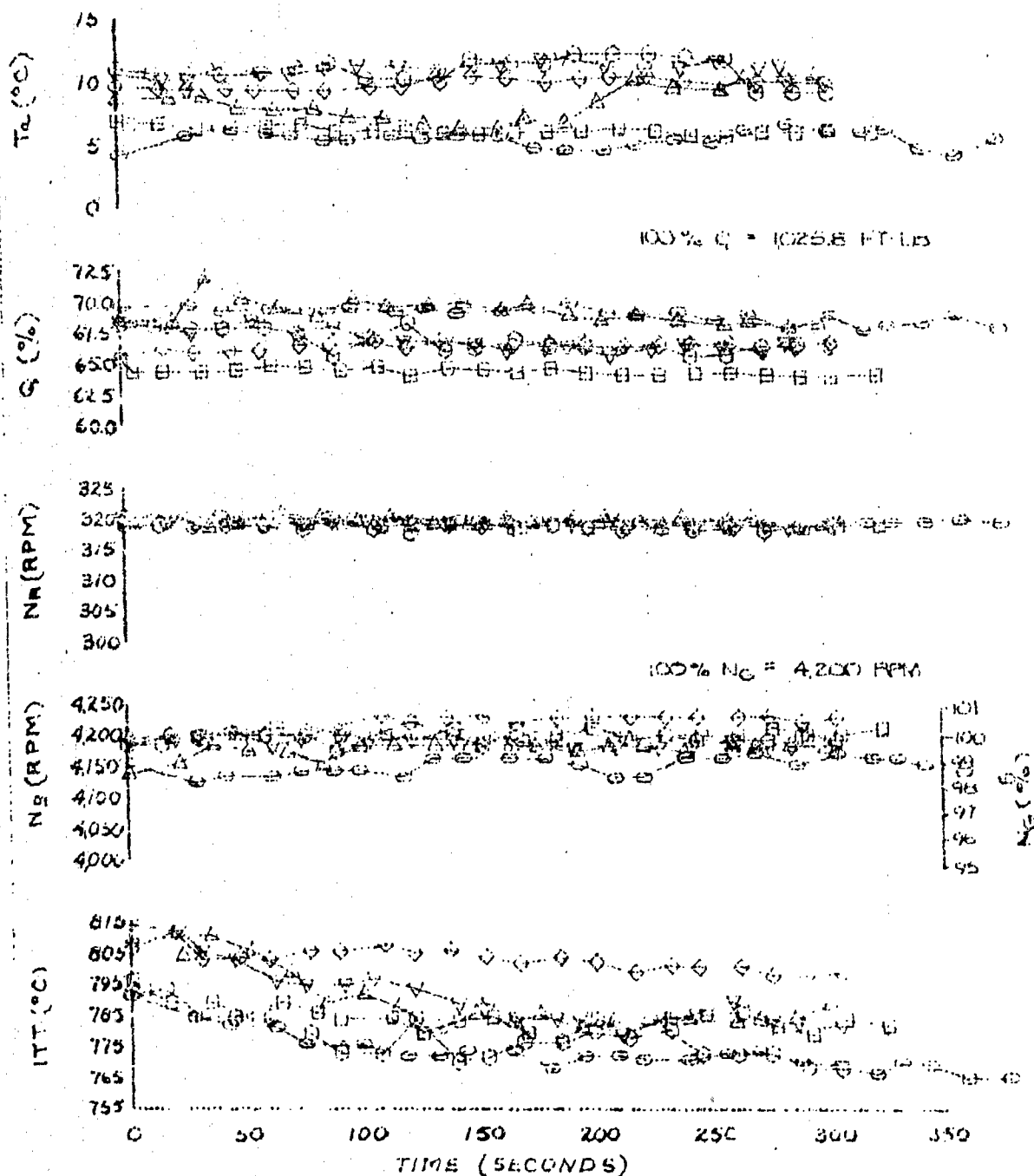
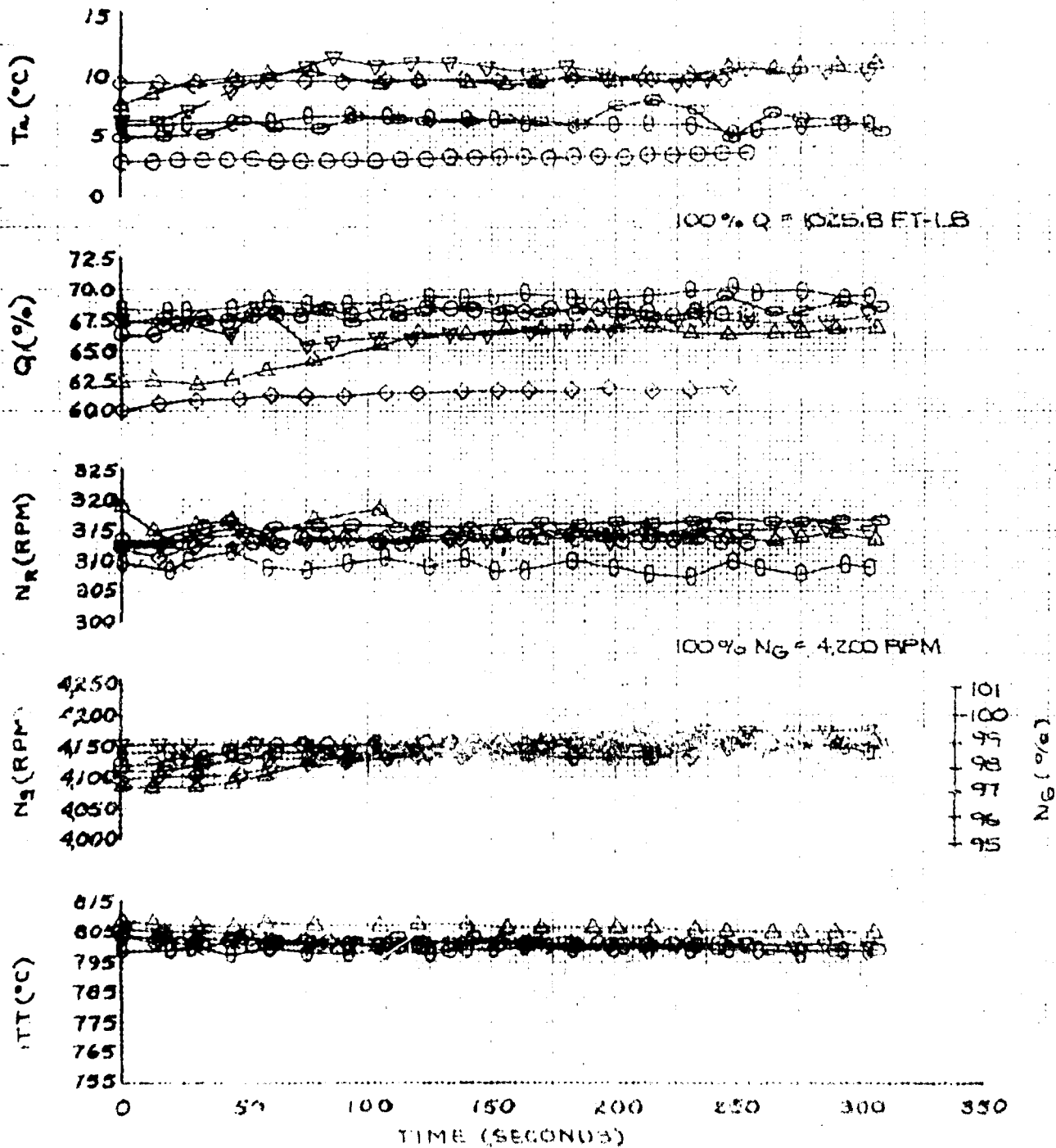


FIGURE 1. TIME HISTORY OF ENGINE TOPPING

UH-1N USAF S/N 68-10776
T400-CP-400 ENGINE
CATEGORY II

NOTES:

- (1) DATA ARE FOR RIGHT ENGINE (NO. 2)
S/N 66122 WITH THE LEFT ENGINE
AT FLIGHT 022



UH-1N UHF S/N68-10776
TA00-CP-400 ENGINE
CATEGORY II

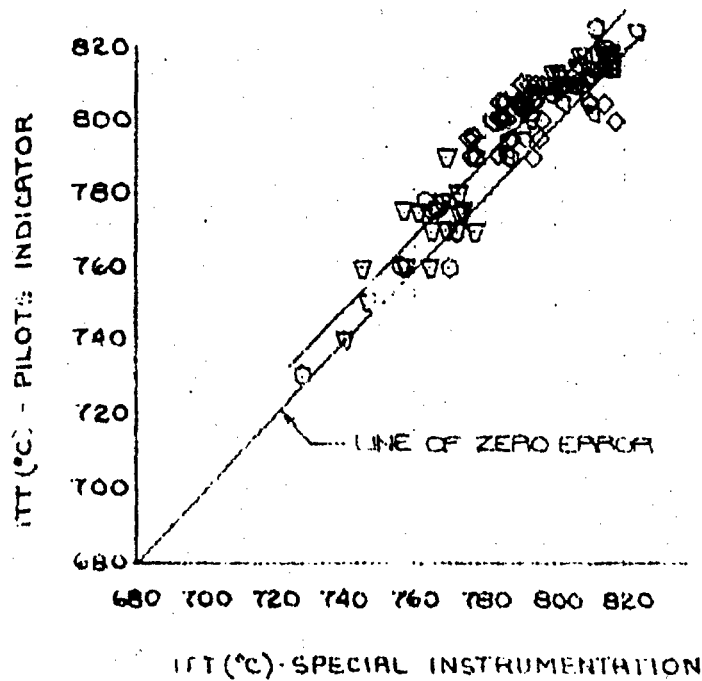
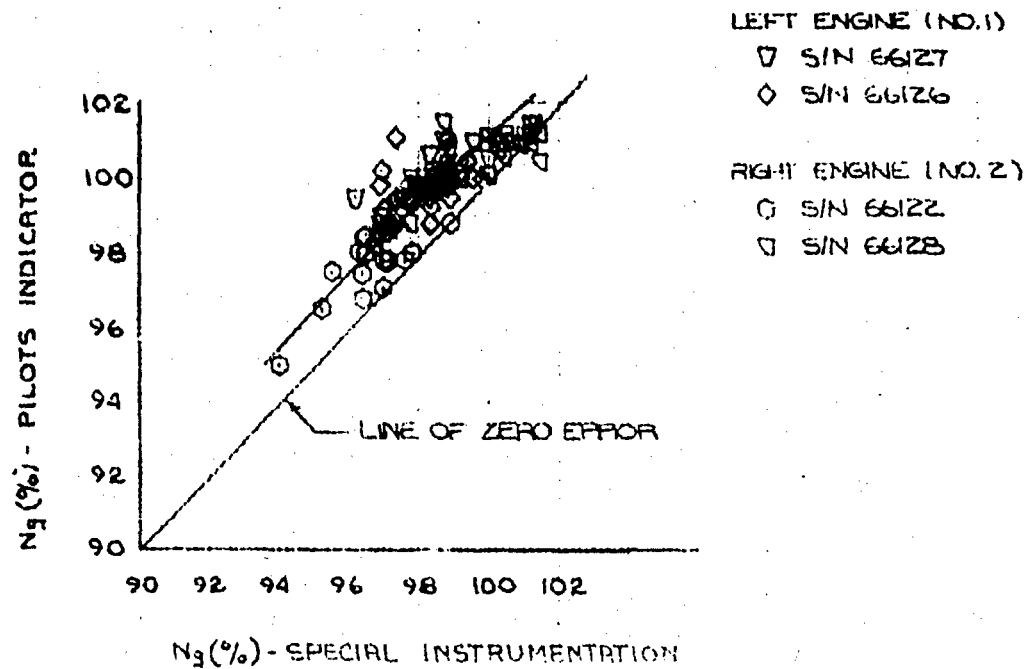


FIGURE 2-2. COMPARISON OF PILOT PANEL AND SPECIAL INSTRUMENTATION
READINGS FOR ITT AND N_3

APPENDIX II

GENERAL AIRCRAFT INFORMATION

Dimensions and Design Data

Overall Dimensions

| | |
|---------------------------------------|---------------|
| Aircraft length (rotors turning) | 57 ft 0.7 in. |
| Height (to top of turning tail rotor) | 14 ft 4.7 in. |
| Height (to top of rotor crown) | 13 ft 1.0 in. |
| Aircraft width (rotors stopped) | 9 ft 4.0 in. |
| Skid width | 8 ft 8.4 in. |

Main Rotor

| | |
|--|----------------------|
| Number of blades | 2 |
| Rotor diameter | 48 ft |
| Rotor disc area (A) | 1809.0 sq ft |
| Blade chord | 23.375 in. |
| Blade airfoil | |
| Blade root to 80-percent radius | NACA 0012 (modified) |
| Blade tip (linear taper from 80-percent radius) | NACA 0006 (modified) |
| Geometric solidity ratio | 0.05167 |
| Main rotor clearance, ground to top (rotor static against stops) | 7 ft 2 in. |
| Forward tilt of rotor shaft | 5 deg |

Main Rotor Blades

| | |
|---|--------------|
| Pitch, collective (measured at the 75-percent radius station) | 0 to +15 deg |
| Pitch, cyclic (measured at hub yoke) | |
| Longitudinal | +12 deg |
| Lateral | +10 deg |
| Flapping | +11 deg |
| Preconing angle | 2.75 deg |
| Blade twist (total) | -10 deg |

Tail Rotor

Number of blades

2

Diameter

3 ft 6 in.

Solidity ratio

0.1436

Tail Rotor Blades

Blade chord (constant)

11.5 in.

Blade twist

0 dec

Hub precone angle

1.5 deg

Airfoil section

NACA 0018 at sta 12.75
tapering to NACA 0008.27
at sta 51.0

Aspect ratio

8.9

Range of flapping

4.88 $\frac{1}{2} \ln 2$

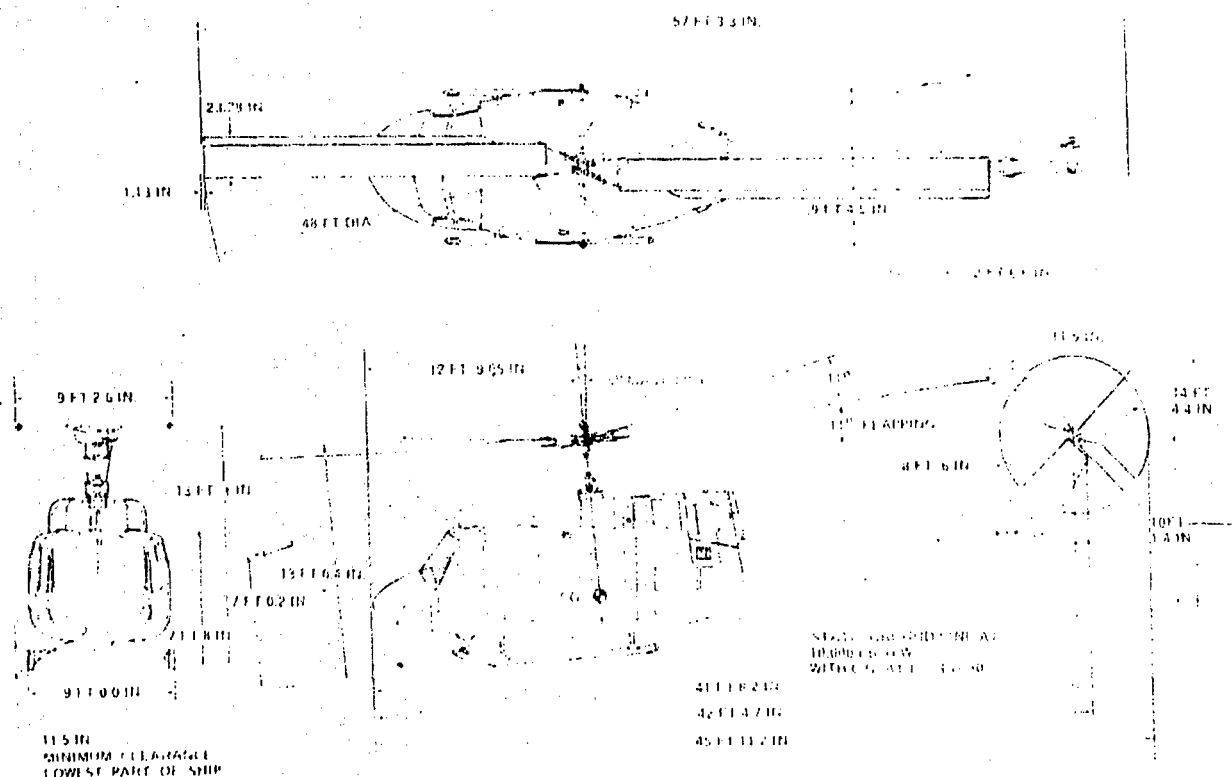


Figure 1 Principal UH-1N Dimensions

Main Rotor Speeds

| | |
|--------------------------|---------|
| Power-on design maximum | 324 rpm |
| Power-on design minimum | 294 rpm |
| Power-off design maximum | 339 rpm |
| Power-off design minimum | 294 rpm |
| Power-on or-off limit | 356 rpm |

Gear Ratios

| | |
|---|---------|
| Engine power turbine speed to engine output shaft speed | 5:1 |
| Main rotor transmission (engine output shaft speed) to main rotor speed | 20.37:1 |
| 90-degree gearbox | 2.59:1 |
| Intermediate gearbox | 1:1 |
| Engine output shaft speed to tail rotor speed | 3.98:1 |
| Tail rotor speed to main rotor speed | 5.122:1 |

Limit Flight Load Factors

At 6,600 lb (basic design gross weight)

| | |
|----------------------|------|
| Maneuver loads (g's) | |
| Positive | 3.5 |
| Negative | -0.5 |

At 10,000 lb (alternate mission gross weight)

| | |
|----------------------|------|
| Maneuver loads (g's) | |
| Positive | 2.3 |
| Negative | 0.33 |

Design Maximum Speed

| | |
|-----------------|----------|
| Level flight | 130 KIAS |
| Sideward flight | 35 KIAS |
| Rearward flight | 30 KIAS |

Main Transmission Rating

At 6,400 rpm output shaft speed

| | |
|---------------------|-----------|
| Takeoff (5-minute) | 1,250 shp |
| Normal (continuous) | 1,100 shp |

Weights

| | |
|---------------------------------|--|
| Design gross weight | 6,600 lb |
| Maximum gross weight (internal) | 10,000 lb |
| Fuel capacity (design) | 212.5 gal (1,381 lb of JP-4 at 6.5 lb/gal) |
| Empty gross weight | 6,000 lb |

Control Riggings

| | |
|---|-----------|
| Collective control full down - Main rotor blade pitch angle at blade root | 7.0 deg |
| Collective control full up - Main rotor blade pitch angle at blade root | 21.0 deg |
| Right pedal full forward - Tail rotor blade pitch angle at blade root | -10.4 deg |
| Left pedal full forward - Tail rotor blade pitch angle at blade root | 21.9 deg |

Rotor Systems

The main rotor is a two-bladed, semi-rigid, teetering type employing precone and underslinging. Each blade is connected to a common yoke by a grip and pitch-change bearings with tension straps to carry centrifugal loads. Teetering motion of the rotor takes place about an axis perpendicular to the spanwise axis of the rotor. A stabilizer bar is provided to improve the inherent stability characteristics of the rotor.

Main rotor blades are "thin tip" blades; the basic NACA 0012 airfoil was modified by introducing a linear taper in thickness from a 12-percent airfoil section at the 80-percent blade radius station to an NACA 0006 airfoil section at the blade tip, and by then attaching a 2-3/8-inch chordwise extension to the blade trailing edge. The extension increases the blade chord length to a constant value along the span of 23-3/8 inches.

The two-bladed tractor tail rotor is a rigid, delta-hinged type employing precone and underslinging. Each blade is connected to a common yoke by a grip and pitch-change bearing; the blade and yoke assembly is attached to the tail rotor shaft by a delta-hinge trunnion to minimize flapping. Tail rotor blades are also of the "thin tip" design, but without the chordwise trailing edge extension.

Rotor control systems are boosted by two irreversible and completely independent hydraulic boost systems. System 1 supplies boost pressure to the cyclic, directional, and collective controls; system 2 supplies boost pressure to the cyclic and collective controls only. Pressure, supplied by two transmission-driven pumps, is admitted to the appropriate boost cylinder through a power cylinder servo valve actuated by movement of the cockpit controls. A force trim system and an artificial force gradient or "feel" are provided for the cyclic and directional controls through a system of magnetic brakes and springs.

Power Plant

The aircraft is powered by a United Aircraft of Canada Limited T400-CP-400 power package consisting of two PT6T free-turbine turboshaft engines, each with an uninstalled rating of 900 shaft horsepower at sea level, standard day conditions. The power sections are coupled to a combining gearbox which has a single output shaft to drive the uprated (1,250 shaft horsepower) main transmission. Overrunning clutches in the drives of the two power sections permit torque to be transmitted in one direction only, providing for single-engine operation and two-engine-out autorotation. An automatic torque matching unit provides for balanced load sharing between the two power sections. The torque matching unit receives oil pressure signals from each power section proportional to the torque output of that engine. Equalization of engine output torques is achieved by comparing the two torque pressures and sending an "increase fuel flow" signal to the automatic fuel control unit of the relatively low-torque-output power section.

The engine combining gearbox has a hydromechanical torquemeter installed as an integral part of the reduction gearing. Figure 2, appendix II, presents the torquemeter operation. The operation of the torquemeter is based on the principle that a torque applied to a helical gear produces an axial force normal to the gear's plane of rotation. The output torque of each engine is transmitted through a helical gear to that engine's torquemeter. The torquemeter senses torque through a helical gear attached to a piston. Torque applied to the gear causes an axial displacement of the piston which, in turn, opens a port allowing oil under pressure to pass through the hollow shaft of the piston to a cavity adjacent to the piston face. Oil pressure against the piston face increases until the axial force caused by the engine torque is neutralized. The relationship between the oil pressure required to neutralize the axial force on the piston and the engine output torque passing through the combining gearbox was determined for the Category II test power sections and gearboxes via laboratory calibrations. The calibrations for power package combining gearbox S/N 4061 with power section S/N's 66121 and 66122 are presented for twin-engine operation in figure 3, appendix II, and for single-engine operation in figures 4 and 5, appendix II. The calibrations for power section S/N's 66127 and 66128 are presented in figures 6 through 8, appendix II.

For twin-engine operation, the relationship between output torque (ft-lb) and torquemeter oil pressure (psi) is independent of power turbine speed, engine oil temperature and bleed valve operation. For single-engine operation, the relationship between output torque and torquemeter oil pressure is independent of power turbine speed and the operating mode of the second power section (flight idle or shut down).

Weight and Balance

The basic weight of the test aircraft, measured with full oil, trapped fuel and test instrumentation installed was 6,733 pounds. The cg location for this configuration was at fuselage station 144.44.

Flight Limits

Center of gravity limits and airspeed limits were obtained from reference 2 and are presented in appendix II, figures 9 and 10, respectively.

Test Instrumentation

Test instrumentation supplied by AFFTC was installed by Bell Helicopter Company (BHC) of Fort Worth, Texas, in accordance with AFFTC drawings. Initial calibrations were accomplished by BHC with subsequent calibrations, modifications, and maintenance being accomplished by AFFTC. The basic instrumentation package consisted of a CEC 5-119-P3-5 50-channel oscillograph, a photorecorder, a time correlation system, a "tail low" warning system, and associated sensors and wiring.

Instrumentation List

See appendix II of FTC-SD-71-50, UH-1N Category II Flying Qualities Evaluation, Air Force Flight Test Center, Edwards AFB, California, January 1972.

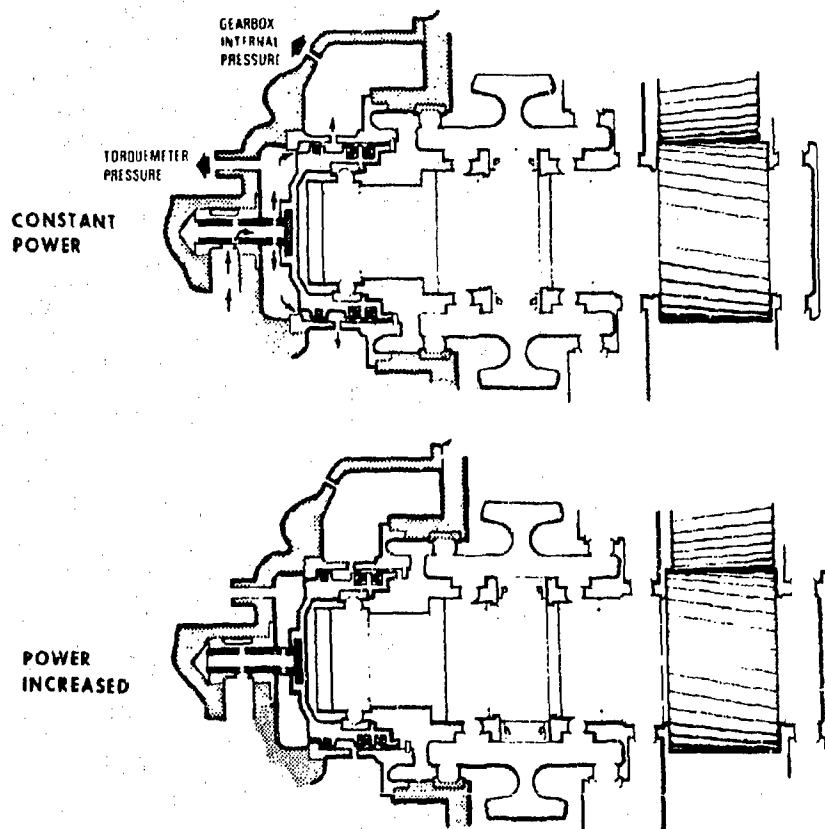


Figure 2 Torquemeter Operation

UH-1H USAF S/N 68-10776
 T400-CP-400 ENGINE
 CATEGORY II
 COMBINING GEARBOX S/N 4061
 TWIN ENGINE OPERATION

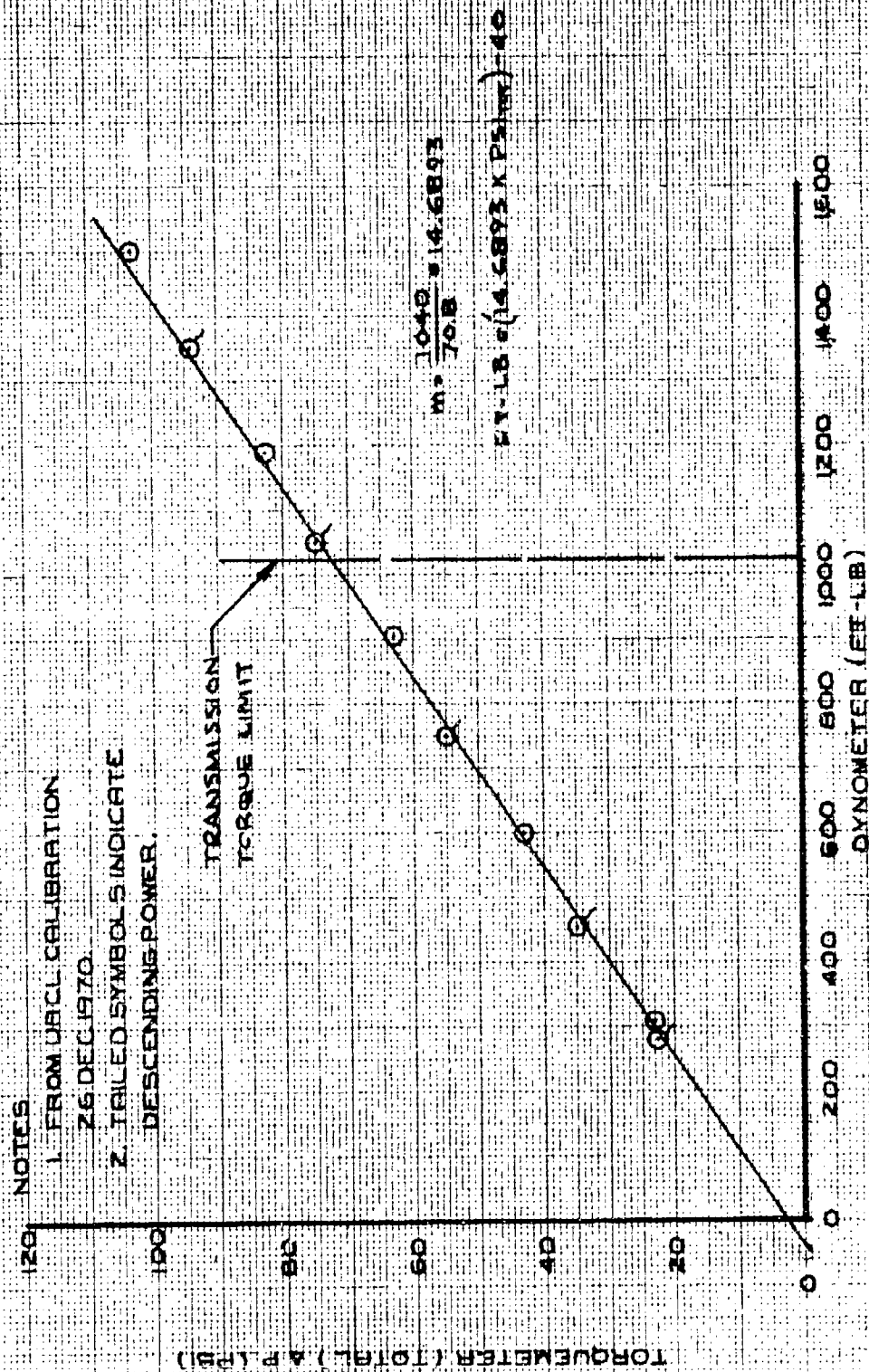


FIGURE 2 COMBINING GEARBOX TORQUEMETER CALIBRATION

UH-1N USAF S/N 68-10776

T400-CP-400 ENGINE

CATEGORY II

COMBINING GEARBOX S/N 4061

LEFT ENGINE S/N 66121

SINGLE ENGINE OPERATION

NOTES

1. FROM UACCL CALIBRATION

6 JAN 1971.

2. TAILED SYMBOLS INDICATE

DESCENDING POWER.

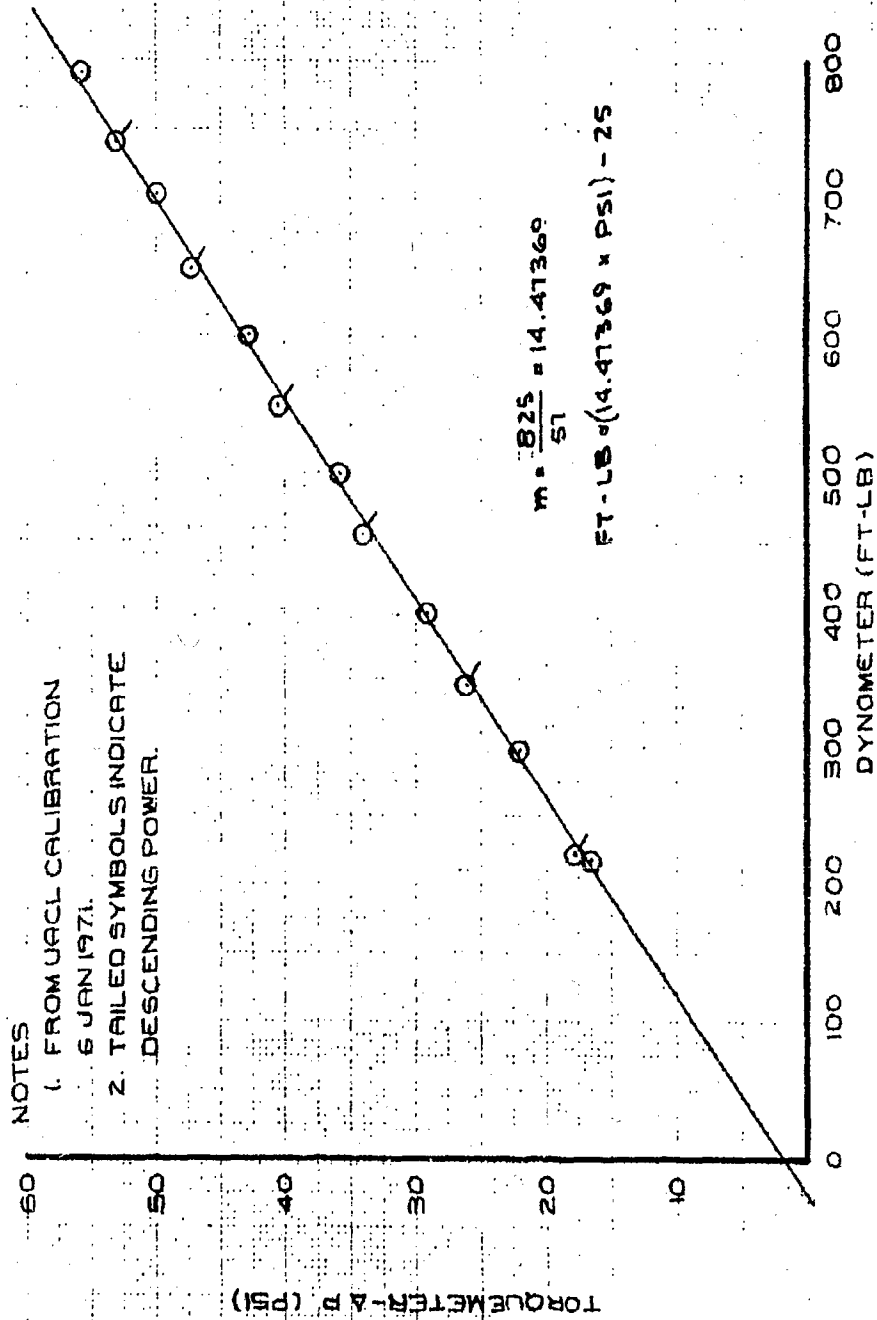


FIGURE 4 COMBINING GEARBOX TORQUEMETER CALIBRATION

UH-1N USAF S/N 68-10776
 T400-CP-400 ENGINE
 CATEGORY II
 COMBINING GEARBOX S/N 4061
 RIGHT ENGINE S/N 66122
 SINGLE ENGINE OPERATION

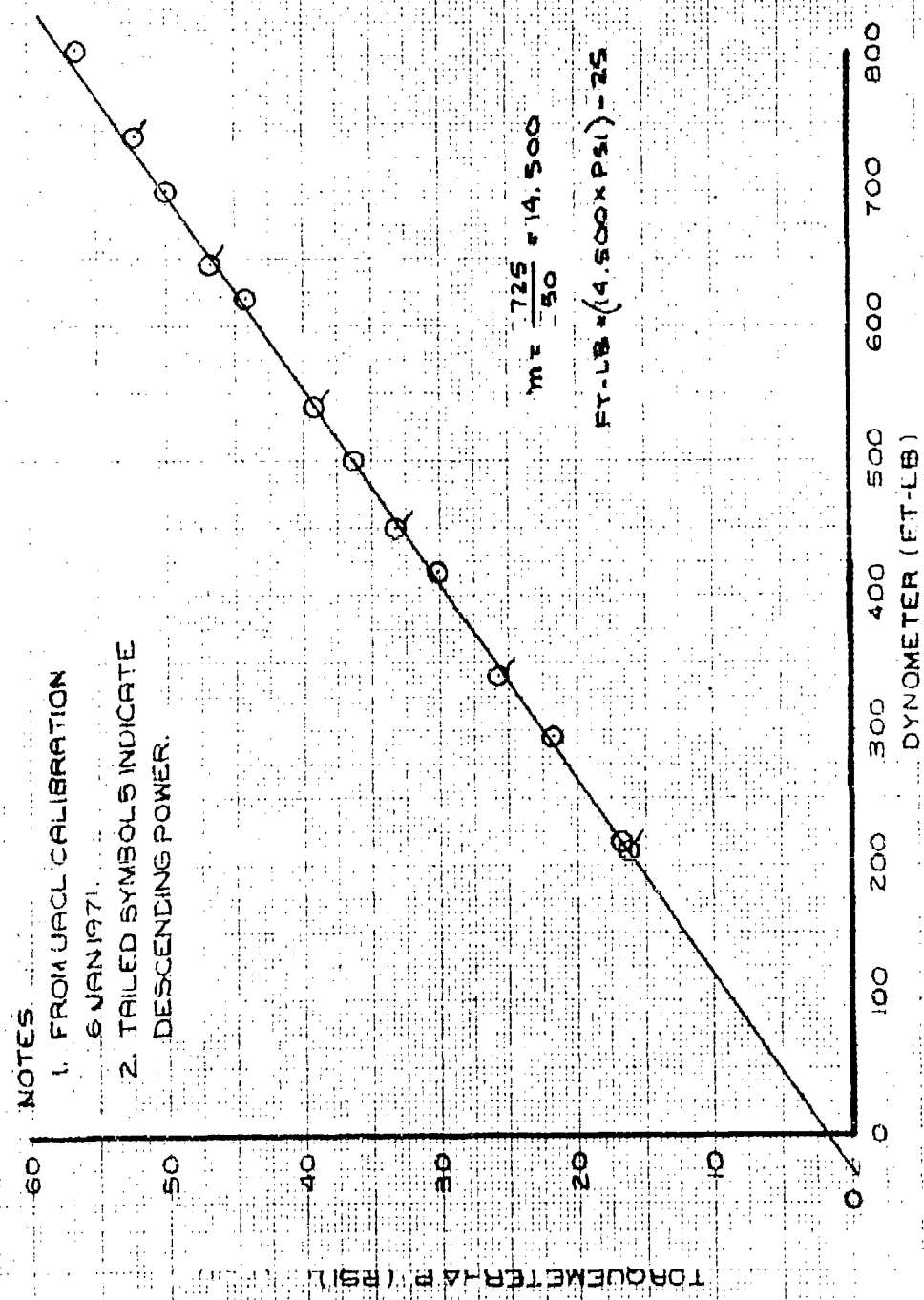


FIGURE 5 COMBINING GEARBOX TORQUEMETER CALIBRATION

UH-1N USAF S/N 68-10776
 T400-CP-400 ENGINE
 CATEGORY II
 COMBINING GEARBOX S/N 4064
 TWIN ENGINE OPERATION

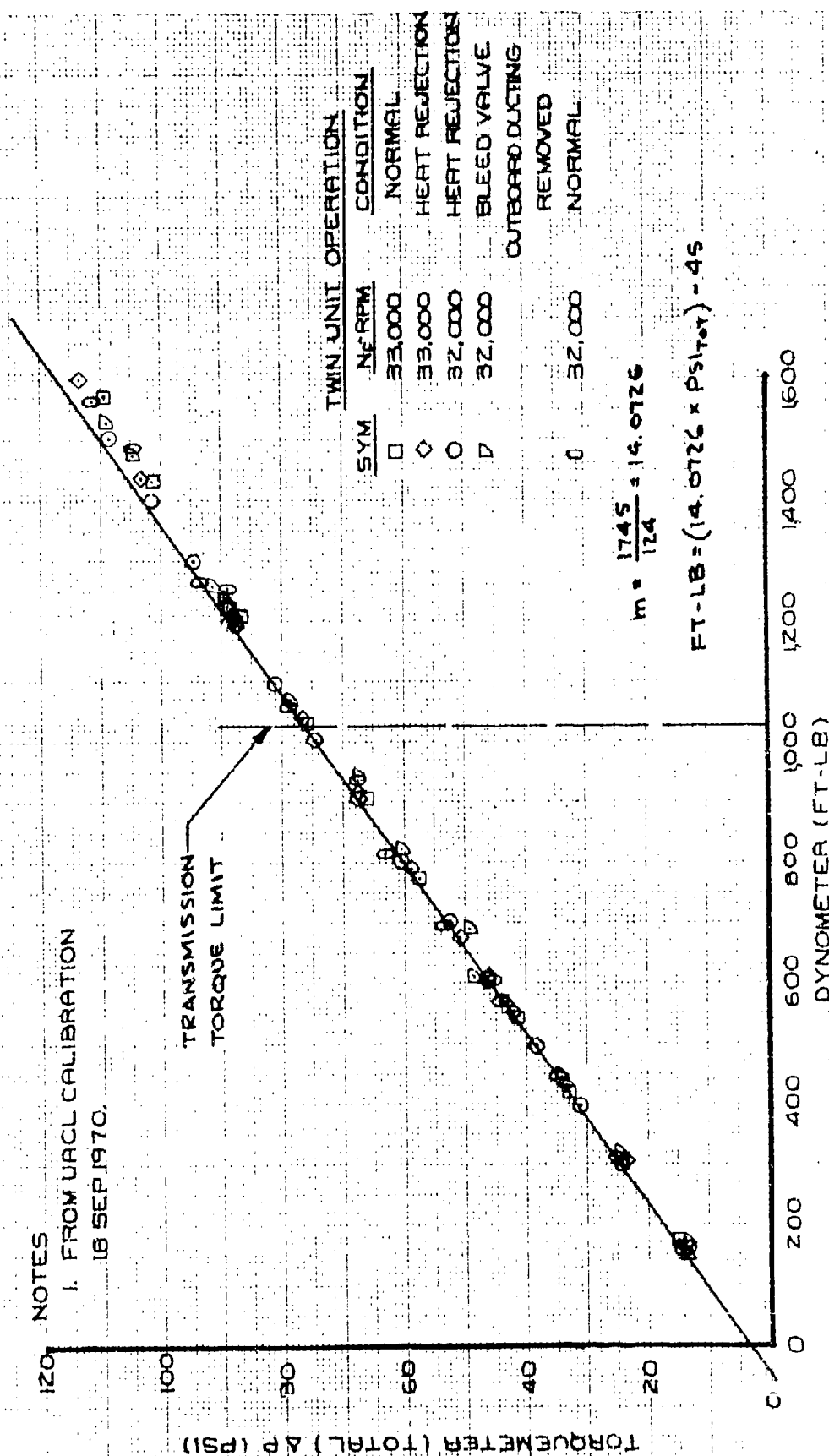


FIGURE 6 COMBINING GEARBOX TORQUEMETER CALIBRATION

UH-1N USAF S/N 68-10776
 T400-CP-400 ENGINE
 CATEGORY II
 COMBINING GEARBOX S/N 4064
 LEFT ENGINE S/N 66127
 SINGLE ENGINE OPERATION

NOTES

1. FROM UACAL CALIBRATION
 18 SEP 1970.

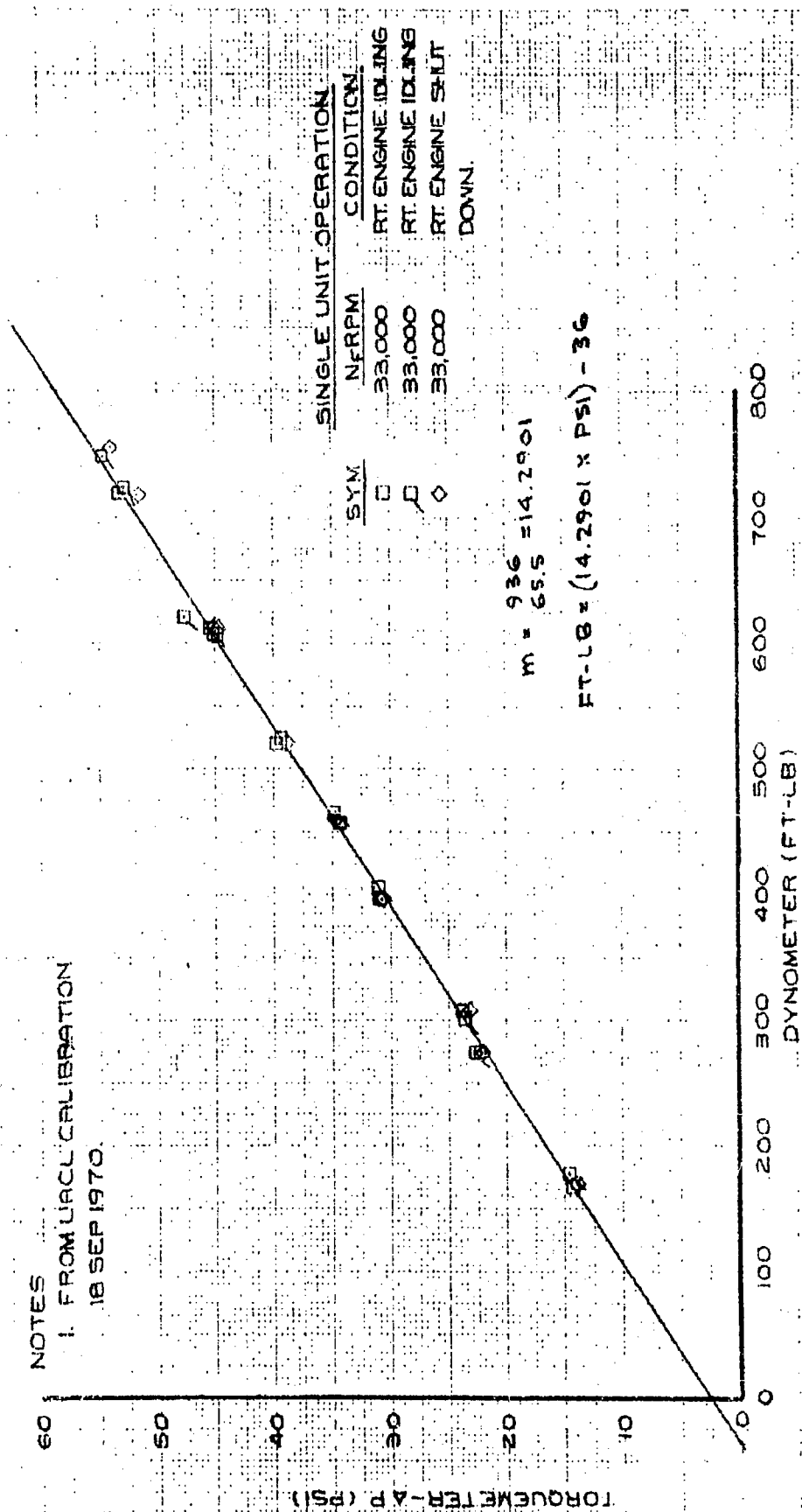


FIGURE 1. COMBINING GEARBOX TORQUEMETER CALIBRATION

UH-1N USAF S/N 68-10776

T400-CP-400 ENGINE

CATEGORY II

COMBINING GEARBOX S/N 4064

RIGHT ENGINE S/N 66128

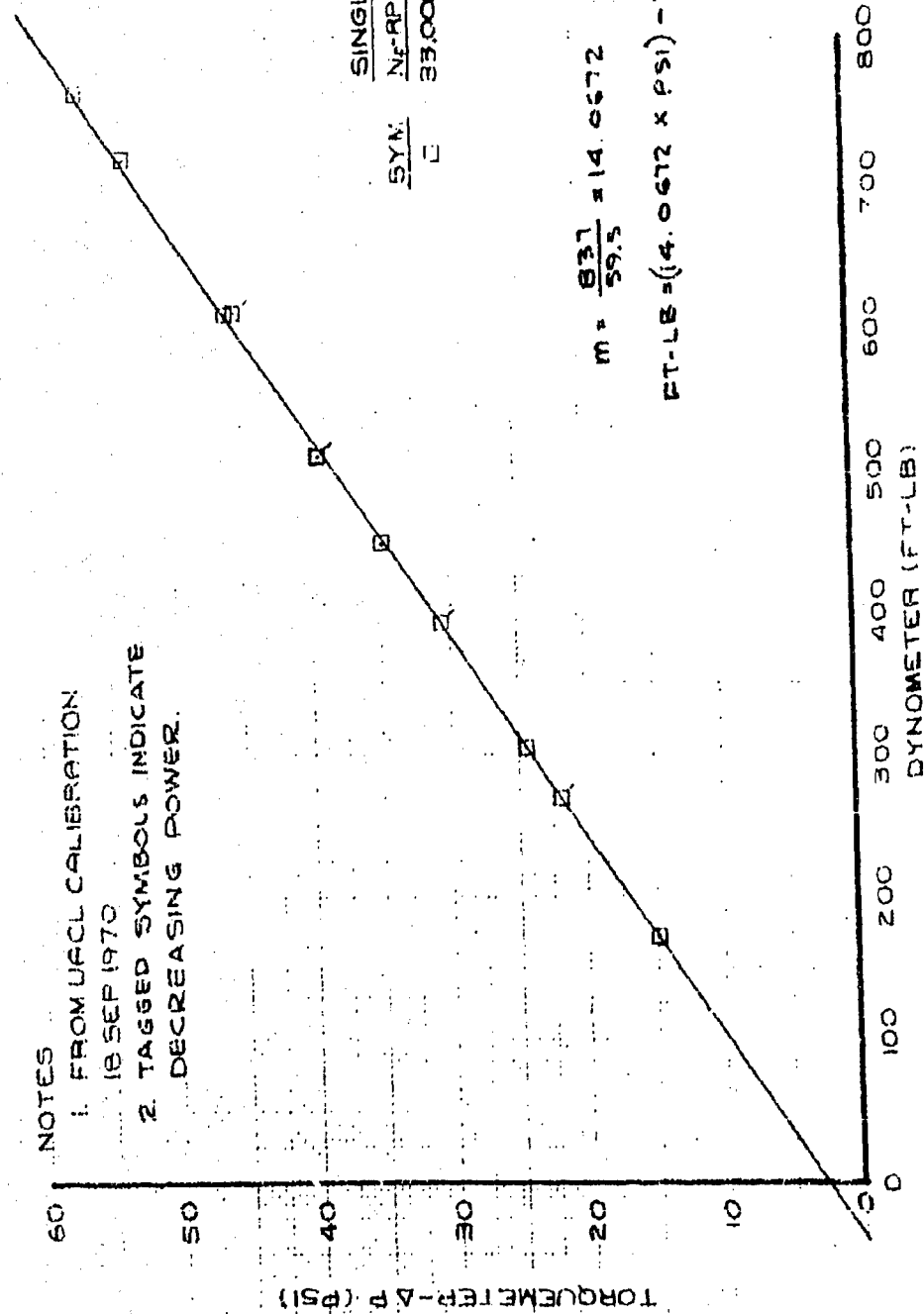
SINGLE ENGINE OPERATION

NOTES

1. FROM UACI CALIBRATION

18 SEP 1970

2. TAGGED SYMBOLS INDICATE
DECREASING POWER.



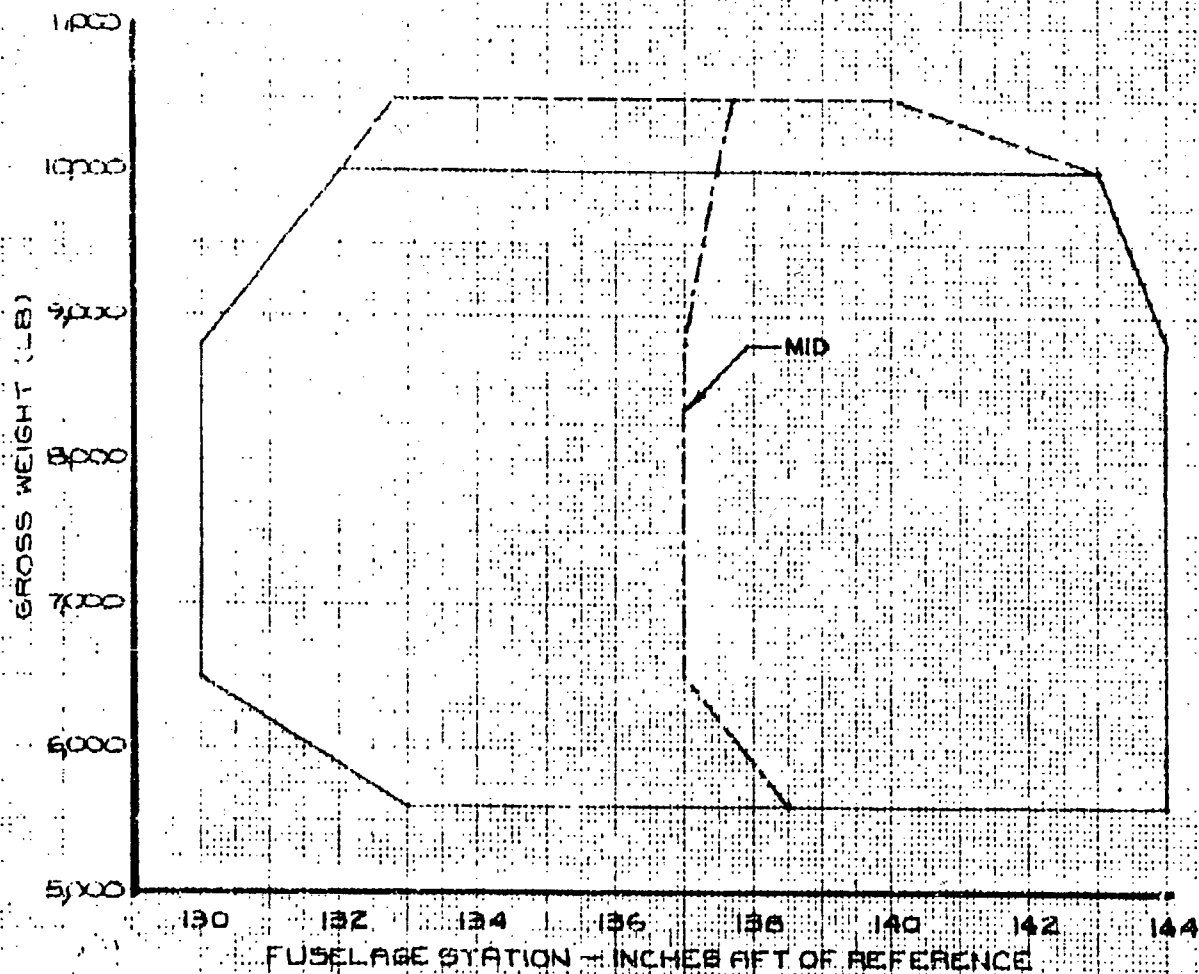
| SINGLE UNIT OPERATION | | |
|-----------------------|---------------------|-------------------|
| SYM | N ₂ -RPM | CONDITION |
| □ | 33,000 | LT. ENGINE IDLING |

$$m = \frac{837}{59.5} = 14.0672$$

$$FT-LB = (14.0672 \times PSI) - 37$$

FIGURE 2 COMBINING GEARBOX TORQUEMETER CALIBRATION

UH-1N W/AF S/N 68-10776
 T400-CP-400 ENGINE
 CATEGORY II



UH-1N USAF S/N 68-10776
 T400-CP-400 ENGINE
 CATEGORY II

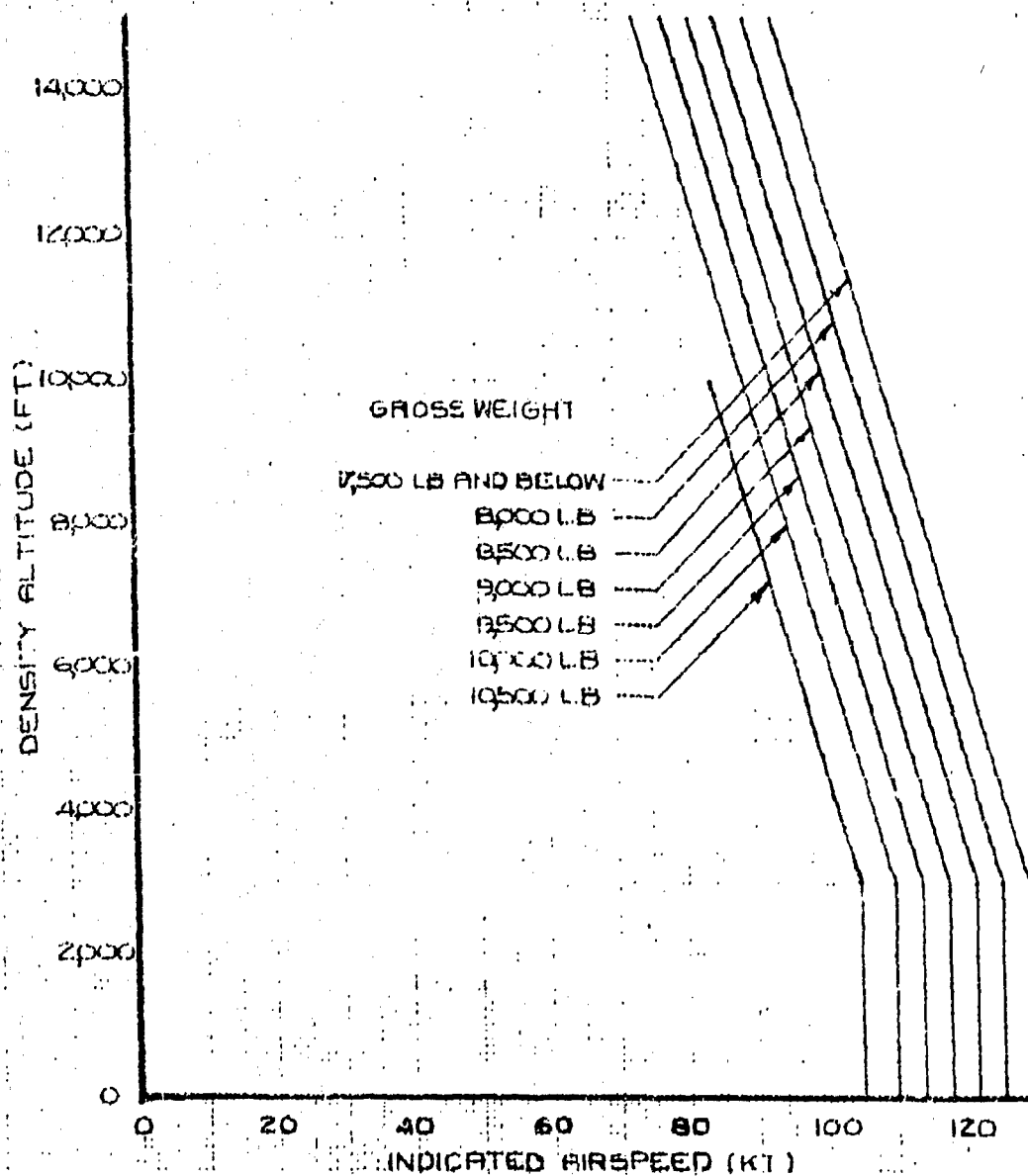


FIGURE 10 AIRSPEED LIMIT ENVELOPE

UNCLASSIFIED

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)

Air Force Flight Test Center
Edwards AFB, California

2a. REPORT SECURITY CLASSIFICATION

Unclassified

2b. GROUP

N/A

3. REPORT TITLE

Category II Performance Test of the UH-1N Helicopter, Volume II.

4. DESCRIPTIVE NOTES (Type of report and inclusive dates)

Final Acct. 17 Nov 70-16 Feb '72, 1

5. AUTHOR (First name, middle initial, last name)

Robert H. Springer
Donald/Bergers Lieutenant Colonel, USAF

6. REPORT DATE

May 72

7a. TOTAL NO. OF PAGES

12

7b. NO. OF REFS

0

8. CONFERENCE OR GRANT NO.

AF-FTC

9. PROJECT NO. Directive 69-49B

9a. ORIGINATOR'S REPORT NUMBER(S)

AF-FTC-TR-72-17-Vol-2

c. Program Structure 443N

9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)

N/A

10. DISTRIBUTION STATEMENT

Distribution limited to U.S. Government agencies only (Test and Evaluation), February 1972. Other requests for this document must be referred to ASD (SDQH), Wright-Patterson AFB, Ohio 45433.

11. SUPPLEMENTARY NOTES

This is Volume II of II.

12. SPONSORING MILITARY ACTIVITY

6510th Test Wing
Edwards AFB, California

13. ABSTRACT

This volume presents the test techniques, data analysis methods, test data, and general aircraft information for the Category II performance evaluation of the UH-1N helicopter

Best Available Copy

Security Classification

Best Available Copy

Security Classification